Gas Journal

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Editorial Notes

The Zurich Conference

WHILE a party of about 40 is actually at Zurich as representative of the British Gas Industry at the Second International Gas Conference of the International Gas Union, we are able to give in this issue such parts of the reports and papers as were available for publication in advance of the meetings. On later pages will be found in full the Report for which the Institution of Gas Engineers has made itself responsible, and which constitutes the contribution of Great Britain to what might be called the Report Stage of the Conference. We notice from the programme that provision is made for discussion upon the Reports presented by the various national bodies, so that the British party will have the opportunity of making further contributions on the spot to the general good, when the Reports supplied by the German, French, Belgian, Czecho-Slovakian, and Swiss Associations are under consideration.

Each Report is printed in full in the language of its sponsors, with a short indication in English, French, and German of its contents. For the convenience of our readers we have summarized more fully those of the Reports which were available in time—giving at length the British Report, and the American Paper by Mr. Clifford E. Paige.

Face the Music

ON several occasions we have pointed to the fact that no stone will be left unturned by the electricians, backed by political influences, to justify the enormous expenditure on the grid; and we have urged every gas undertaking to put its house in order, to meet a wave of competition hitherto unknown. The wave is about to break, but it will not submerge *modern* gas service. It is, on the other hand, quite capable of swamping out-of-date gas supply. The intensity of the competition we shall have to face can be gauged from a statement made last week by a member of the Electricity Commissioners to the effect that the whole question of reorganization on the distributive side is now under consideration. At present there are about 660 distributing undertakings—a number which, it is thought, is excessive and not in the best interests of increased electricity sales. The Commission is going to concentrate attention on this matter, to effect a higher standard of distribution and salesmanship; and there can be no question but that the tightening-up will necessitate still greater efforts on the part of the Gas Industry.

Decisions in regard to the advisability of amalgamation and grouping of the electricity distributors are in the air—where, we imagine, they will not remain long. The Ministry of Transport, with the concurrence of the Board of Trade, recently appointed Mr. J. M. Kennedy to be a Commissioner. He is the chief technical member of the Commission, and his sole job is concerned with distribution of electricity to the consumer. There is going to be a powerful electrical sales push, and there can be little doubt that electricity undertakings which show apathy and lag behind the others will be dealt with unceremoniously. New legislation will be introduced if other means fail; and Acts of Parliament which concern electricity are likely to be viewed with a benevolent eye.

Another statement—this by an official of the Central Electricity Board, which is principally concerned with the supply and main transmission only of electricity—was also made last week. He said that, from a technical point of view (note the " technical ") the grid system is working satisfactorily. Everything, of course, depends on sales. At any rate, expenditure on the grid has by no means come to an end. A series of five water-power plants is being constructed in South Scotland, two of which have already been completed. When finished, these plants " will supply millions of units per annum to the grid for distribution in North-West England and Central Scotland." This country, it was stated, is ahead of the world in domestic, commercial, and rural electrification. Which contrasts strangely with the view of Mr. Arthur Hewitt, of Toronto, who considers that the British Gas Industry is enjoying a good time, and that competition at present is merely a threat.

Our answer to electrical competition lies in new forms of rates, anticipatory costing, modern sales methods; and it is interesting to see what this answer really means. In recent issues of the " JOURNAL " we have given the results of a large number of gas undertakings during the past financial year; and these results make good reading. To quote a few, an increase of 18% in gas sales has been recorded at Stretford, due largely to anticipatory costing. Both Rotherham and Heywood show an increase of 13%; both Rotherham and Heywood operate optional multi-part tariffs. Smethwick returns an increase of 8%, and St. Helens is close upon its heels with a 7% increase. So we could go on. Broken records, too, are the order of the day in regard to appliances installed. We shall have to face keener competition heavily loaded with political bias; but the few results quoted here show what can be done, and should provide incentive to still greater effort.

Assurance Needed

GRID failures have by this time almost ceased to be "news," and the same may be said of electric light stoppages during hospital operations. Both figured once more in the papers last week, but probably little notice was taken of them, except by direct sufferers.

There was, however, on another day of the week reported a different sort of accident, in which electricity was concerned, and which, in the absence of reassuring explanations, must continue to cause a good deal of anxiety. Along with very many other people, we have on occasion made critical reference to the now familiar pylon, but hitherto our objections have been mainly upon æsthetic grounds, though the element of danger has also received due recognition at our hands. Last week's occurrence has emphasized the latter aspect of the subject so as to make it rank in importance far in advance of any question of mere ugliness. Those electrical friends who have so keen a scent for danger, or supposed danger, where gas is concerned, will doubtless agree with this.

As recorded in the newspapers, "when a high-tension electric cable carrying 33,000 volts snapped over some waste land by Chequers Lane, Dagenham, an acre of grass was set on fire. The fire spread quickly, and the flames licked round the base of one of the pylons. The Dagenham Fire Brigade was called when a transformer sub-station was threatened. The flames were soon extinguished, and there was no interference with the service, the current being automatically taken over by another cable." It was explained that the cable which snapped was suspended from two pylons forming part of the grid scheme, and conveyed current to Southend and South Essex from the Barking Power Station.

Assuming the report above quoted from to be accurate, the question to which people would like to have an authoritative answer is: What would have happened had the cable snapped elsewhere than on waste land? Though cable pylons may be chiefly built well away from buildings, the possibility of a similar accident occurring in a different locality from "waste land" must have suggested itself to the public mind, and no stone should be left unturned by the electricians (if, indeed, there are any stones that can be turned) to allay anxiety.

An Aid to Sales

IT is commonly agreed that many loads are awaiting development if gas can be sold at preferential rates which these loads completely justify. An example is the water heating load, as our competitors the electricians fully realize, and offer current at low prices for night-time use. There is no reason why great strides should not be made by our Industry in the installation of comparatively large thermal storage water heaters to consume gas at special rates during specified periods—periods which even-up the load curve. And in the "JOURNAL" today is a description of an ingenious, yet simple, means of helping gas undertakings to gain such fresh business.

The description is by Mr. C. H. Chester, General Manager and Secretary to the Swindon United Gas Company, who for the past two years has been studying ways and means to fill up the troughs in his load curve. An idea of the peaks and hollows at Swindon—which is by no means an isolated example—will be gained from the fact that during the hot summer spell 60% of the gas sold was distributed in the three cooking hours from 10.30 a.m. and 1.30 p.m., and the sales of gas from 11 p.m. to 6 a.m. were negligible, representing less than 2½%. Mr. Chester conceived the idea that if one meter could be offered to a consumer which would record gas at different costs at different hours, the position would be greatly altered; and in collaboration with Messrs. George Wilson Gas Meters, Ltd., such a meter has been evolved. The principle of the meter is quite simple. There are two dials—more could be used should the load factor require them—and a clock mechanism. At a predetermined hour the clock actuates rolling gear from one dial to the other, and after a defined period the reverse action takes place. Thus, with this type of meter there should be no difficulty in the rendering of accounts, and the consumer can ascertain at any time the amount of gas he has burned at the different prices.

In our reference to preferential rates above we mentioned particularly the water heating load, but only as an example; it will be appreciated that preferential rates for off-peak periods offer the great possibilities of extending existing business and opening-up new fields.

Rating and Valuation of Gas Undertakings

THE almost chaotic state of the existing law relating to the valuation of public utility hereditaments for rating purposes is, unfortunately, only too well illustrated—if further proof were needed—by the case before the Essex Quarter Sessions recently on the appeal of the Gas Light and Coke Company against the rateable value proposed to be made by the Southern Essex Assessment Committee upon that part of the Company's undertaking extending into the area of the Dagenham Urban District.

Rating has never approached the standard of an exact science; nevertheless, the wide divergencies obtaining in various parts of the country and the extraordinary theories being put forward by certain rating surveyors employed by local authorities merit serious consideration.

Despite the extremely comprehensive nature of the consolidating Act of 1925, and the expressed legislative intention that it should not only simplify the law of rating but promote uniformity in valuation, the decision in the case of *Kingston Union Assessment Committee v. Metropolitan Water Board* (1926; A.C. 331; 42 T.L.R. 275), and the definite recommendations of the Central Valuation Committee (set up by virtue of the 1925 Act for the purpose of furthering the objects of simplification and promotion of uniformity) with regard to the assessment of public utility undertakings, it would appear from the arguments advanced on behalf of the Rating Authority in the present case, as well as in the Bath Gas Company's appeal (1929), that a most unsatisfactory state of affairs exists. Whether this would be overcome by the establishment of a Central Valuation Authority—on the lines of the Railway Assessment Authority—constituted for the valuation of "special properties," as was envisaged when the Bill of 1925 was originally introduced, we are not at present concerned to argue. We merely emphasize the apparent difficulty in applying the three legislative measures to which reference has been made.

It may be objected that the position is complicated by the fact that whereas the particular assessment is governed by the Rating and Valuation Act, 1925, London rating is subject (as was emphasized in the debate in the House of Commons last March on the Second Reading of the Rating and Valuation (Metropolis) Bill, 1934) to anomalies arising from the continued application of the Valuation (Metropolis) Act, 1869, to hereditaments in London; that the decision in the *Kingston* case was, in fact, accepted by both parties to the Gas Light and Coke Company's appeal; and that the Central Valuation

Committee is, by its nature, an advisory body empowered only to make representations to the Minister of Health. In reply it can be argued that the Rating and Valuation Act, 1928, applies certain of the provisions of the 1925 Act to London, and that recommendations of the Central Valuation Committee have been in all instances adopted by the Minister and issued to all local rating authorities.

Notwithstanding, the fact remains that two eminent Rating Surveyors arrived, to all intents and purposes on the basis of these rulings and the same accounts, at such widely differing computations of rateable value as £2,546 and £7,999 respectively.

The Conclusion

WHAT is perhaps quite as unsatisfactory is the conclusion—which we submit is the only one at which to arrive—that after hearing learned counsel on both sides and considering expert evidence, the Court felt unable to make any pronouncement upon the merits or demerits of the appeal and reduced the assessment, not to any justifiable amount, but to the rateable value for the previous year, viz., £5,222.

Thus the Justices gave no indication whether or no they agreed with the contention of the appellant gas company that the *Kingston* formula must be strictly applied and the "profits" basis adopted for the valuation of the undertaking. Furthermore, the Court neither accepted nor rejected the revolutionary proposal that (as suggested, but rejected, in the *Bath* case) the division of the net receipts of the undertaking between landlord and tenant should depart from the traditional method whereby a percentage (in this instance 15% was claimed) of the hypothetical tenant's capital is deducted and the balance, less rates, regarded as the rateable value. Instead, the Rating Surveyor proposed—and stated that he had applied the same reasoning in the valuing of 450 public utility undertakings on behalf of Rating Authorities—that the tenant should be allowed 12½% on the turnover, which was only some two-thirds of the amount arrived at by taking a percentage of 15% on tenant's capital. He denied, in cross-examination, that he had first arrived at the landlord's share, but it is submitted that the remuneration of the hypothetical tenant on the basis of turnover is far from satisfactory and must produce anomalies, inasmuch as some undertakings are required to sink a larger sum in the provision of apparatus on hire than others whose consumers are in favour of purchasing their own.

It is pertinent to note that at the conference (referred to in the "JOURNAL" on May 20 and Sept. 23, 1931) of public utility interests which resulted in the setting up by the Central Valuation Committee of a Sub-Committee specially to deal with the difficulties experienced in the valuation of "special properties," the problems arising in the rating of the Gas Light and Coke Company were instanced as typical of the difficulties involved in assessing for rating purposes extensive hereditaments extending into several rating areas. Much may have been achieved, but it is little consolation to know that costly litigation is still necessary even in comparatively minor apportionments of the *cumulo* valuation.

Protection for the Owner

THERE is the further difficulty that, whereas it has been judicially held that the Court must protect the owner from being rated beyond the rateable value of the whole undertaking (*R. v. West Middlesex Water Works* Company (1859; 28 L.J.M.C. 135)), any increase in the apportionment in a particular rating area will lead to an increase in the *cumulo* quite contrary to the intention of Parliament and the aim of the Central Valuation Committee. This was evidenced in the recent case of *City of London Electric Lighting Company v. Southwark Assessment Committee* ("JOURNAL" for Jan. 3, page 42, and March 14, page 671), where it was pointed out that any increase in a particular parish could not be recouped by an adjustment of the general apportionment except by means of legal action against all the remaining Rating Authorities—a truly formidable and costly task with not even a certainty of success.

In conclusion, it is interesting to observe that the Essex Quarter Sessions upheld the contention of the appellant Company that it was competent to consider the valuation of the whole undertaking—not limited only to the rateable value of that portion within the Dagenham area—even although the appeal did not relate to a year of quinquennial re-assessment. This was allowed to admit evidence, in support of the appeal, which had not been taken before the Assessment Committee—following the ruling in *Gateshead Union Assessment Committee v. Redheugh Colliery Company* (1925; A.C. 309).

Is it too much to hope that an early opportunity will be taken to test the theory advanced by the South Essex Assessment Committee and by other Rating Authorities adopting the reasoning advanced in this case—even if it be necessary to carry the case to the House of Lords, to which Supreme Tribunal the *Kingston* case was taken? Alternatively, it would appear that public utility undertakings are the legitimate prey for innovations in rating practice to which the peculiar conditions appertaining to "special properties" particularly make them liable.

Forthcoming Engagements.

Sept. 7.—SOUTHERN ASSOCIATION (WESTERN DISTRICT).—Commercial Meeting at Dartmouth, 2.30 p.m.
Sept. 11.—I.G.E.—Finance Sub-Committee, 9.45 a.m.; Membership Sub-Committee, 10.30 a.m.; General Purposes Committee, 11.15 a.m.; Gas Education Executive Committee, 4 p.m.
Sept. 11.—N.G.C.—Meeting of Central Executive Board at 28, Grosvenor Gardens, S.W. 1, at 2.30 p.m.
Sept. 17-20.—ASSOCIATION OF PUBLIC LIGHTING ENGINEERS.—Eleventh Annual Meeting at Aberdeen.
Sept. 20.—I.G.E.—Refractory Materials Joint Sub-Committee (Stoke-on-Trent), 2.30 p.m.
Sept. 20.—WALES AND MONMOUTHSHIRE ASSOCIATION.—General Meeting at Porthcawl.
Sept. 20.—CERAMIC SOCIETY.—Autumn Meeting of Refractory Materials and Building Materials Section at Olympia, London, during Building Trades Exhibition.
Sept. 24-26.—B.C.G.A.—Annual General Meeting and Conference at Sheffield.
Sept. 25.—S.B.G.I.—Meeting of Council, Royal Victoria Station Hotel, 4.45 p.m.
Sept. 27.—I.G.E.—Liquor Effluents and Ammonia Sub-Committee. 2.30 p.m.
Sept. 28.—I.G.E.—Joint Research Committee, 10.30 a.m.; General Research Committee, 2.30 p.m.
Oct. 5.—NORTH OF ENGLAND ASSOCIATION.—Autumn Meeting. Presidential Address of R. H. Duxbury, of South Bank, and visit to I.C.I. works at Billingham.
Nov. 6 and 7.—I.G.E.—Autumn Research Meeting.
Nov. 8.—S.B.G.I.—Autumn General Meeting, Hotel Metropole, London.

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Page 36. ILMINSTER. T. Handel (Junr.) M. & S. vice T. Handel, retired.
Page 62. SILLOTH. Holme Cultram Urban District should now read Wigton Rural District Council.
Page 127. SOUTHPORT. J. H. Clegg appointed Public Lighting Superintendent vice J. Bond, retired.

Personal

NEW PRESIDENT OF THE INSTITUTE OF FUEL.

In April last Sir John Cadman, K.C.M.G., D.Sc., was elected President of the Institute of Fuel, dating from the year commencing October, 1934. It was originally arranged that he should give his Presidential Address in London on Oct. 17, to be followed by the Melchett Lecture and the presentation of the Melchett Medal at the Annual Dinner of the Institution in the evening of the same day.

Owing to a change in Sir John's programme, that date was subsequently postponed until Jan. 10, 1935. A still further alteration in his programme has had to be made just recently, the effect of which is that it will be quite impossible for him to be in England until probably February next. It was decided, therefore, with Sir John's concurrence, to postpone his term of office as President until the year commencing October, 1935, and that Sir Harry McGowan, K.B.E., Chairman of Imperial Chemical Industries, Ltd., should be invited to become President as from October next, which invitation he has accepted.

Sir Harry McGowan will give his Presidential Address at a meeting to be held in London at 11.30 a.m. on Monday, Nov. 12. The Melchett Lecture will be given by Dr. Bergius at 2.30 p.m. on that day, to be followed by the Annual Dinner, Dance, and Cabaret, at the Connaught Rooms, Great Queen Street, W.C. 2, at 6.45 for 7.15 p.m., the Melchett Medal being presented to Dr. Bergius immediately following the dinner.

* * *

We are glad to learn that Sir FRANCIS GOODENOUGH, the Executive Chairman of the British Commercial Gas Association, who was taken seriously ill in April and underwent an operation in July, is stated to have benefited greatly by a course of waters at Llandrindod Wells and a fortnight in Devonshire. During September he is hoping to attend the Autumn Meeting of the North British Association of Gas Managers at Inverness, the Annual Conference of the British Commercial Gas Association at Sheffield, and the Annual Meeting, in London, of the Incorporated Sales Managers' Association, when he will resign the Presidential Chair, which he has occupied for five years, to Sir Malcolm Robertson.

Obituary

The death has occurred as the result of an accident of Lieut.-Colonel MAURICE MCCLEAN BIDDER, D.S.O., of Clive Court, Maida Vale. He was on the Board of the Danish Gas Company and for many years he acted as Chairman. Other companies of which he was a Director included the Ceará Gas Company, Ltd.

News In Brief

A Broadcast Concert was Given by the Glasgow Corporation Gas Department Band, conducted by Mr. Herbert Bennett, in the Scottish Regional programme on Aug. 29.

The "Gas Salesman" For September, owing to the incidence of the Saturdays in this month, will be published on the twenty-second of the month instead of the more usual third Saturday.

The Chairman of the Electricity Committee of the Weymouth Corporation (Alderman T. J. Guppy, J.P.) showed his appreciation of the importance of the Gas Industry when he opened recently, in his capacity of Mayor, the travelling showroom of the Weymouth Consumers' Gas Company, which has been touring the district for the past fortnight.

Slum Clearance on Sound Lines is the subject of an attractively illustrated booklet just produced by the British Commercial Gas Association. How successfully the introduction of up-to-date gas appliances for cooking, water heating, and room warming is helping in the task of slum clearance is shown in this booklet (No. 244 of "A Thousand and One Uses for Gas").

Coke Oven Bye-Product Plant.—The Shelton Iron, Steel, and Coal Company, Ltd., have placed an order with Messrs. W. C. Holmes & Co., Ltd., of Huddersfield, for the extension of their coke oven bye-product plant, necessitated by their new oven construction. The work to be carried out includes condensers, saturators, benzole washers, and extensions to benzole recovery plant.

Alloy Cast Iron Grate Bars.—An American foundry supplying grate bars to a local gas undertaking is using an alloy cast iron containing 1% nickel and 0·35% chromium which is reported to give a considerably longer life than ordinary cast iron. Before using nickel and chromium additions, 24 grate bars were supplied every two months, but since the adoption of the alloy cast iron 12 grate bars every six months are sufficient. In other words, the life of the grate bars is increased six times by using the alloy cast iron.

An Appeal Was Made to the Gas Committee of Glasgow Corporation on Aug. 31 to reconsider their refusal to purchase the Nitshill and Hurlet Gas Company. The Company offered to sell their business to the Corporation for £4,000, and later the figure was reduced to £2,300, but the Gas Committee preferred to make their own arrangements for supplying the area. The Gas Department hold that there is no need to take over the plant or the pipes of the Company, as the Corporation have full power to supply the district.

A Reduction in the Price of Gas has been announced by the Tain Corporation Gas Department. The old price of 11s. 3d. per 1,000 c.ft., which was believed to be the highest in Scotland, has now been reduced to 10s. The Undertaking reports a small profit for the past year, the first for many years, and it is hoped that the price reduction will lead to increased consumption.

A Dividend of 5%, less income-tax, was declared by the Directors of the Camborne Gas Company, Ltd., at the annual meeting held on Aug. 28. The announcement was made that the Company had accepted the offer of the South-Western Gas Corporation to acquire whole or part of their issued share capital. Mr. S. J. Ingram, Engineer and Managing Director of the Camborne Gas Company, was congratulated on his appointment as Chairman of the Corporation as well as Technical Director.

"H. & G." Complete Gasification Plant in France.—Messrs. Humphreys & Glasgow inform us that their French associates, La Société de Construction d'Appareils pour Gaz à l'Eau et Gaz Industriels, have recently secured a contract for automatic complete gasification plant at the Clermont Ferrand Gas-Works of the Cie. Hydro Electrique d'Auvergne. It comprises two complete units of the "H. & G." patented system, in conjunction with carburettor and superheater, to enable coal water gas to be enriched to any desired calorific value. The latest features incorporated in this plant include automatic clinker discharge from the generator, automatic control of all the valves, automatic charging of fuel to the generator, and recuperation of waste heat by a new type of waste-heat boiler. The plant has a rated capacity from each set, when working with coal, of 480,000 c.ft. per day, and when working with coke of 520,000 c.ft. per day, both these capacities referring to oil-enriched gas of a calorific value of the French standard of 475 B.Th.U. The plant has been installed to handle rather exceptional fuels, particularly coals and coke of the smaller sizes, and also mixtures of coals and coke dust, the latter being a residual product of the works, the disposal of which has previously been difficult.

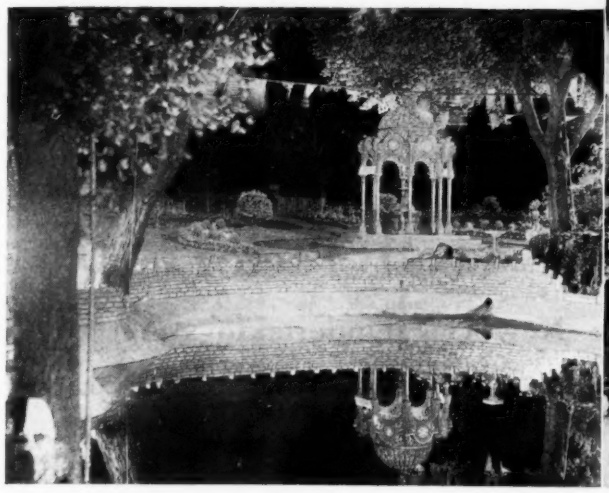
Amalgamation and Grouping.

South-Western Gas Corporation.

An offer of the South-Western Gas Corporation, Ltd., to purchase the whole or part of the issued share capital of the Camborne Gas Company, Ltd., was accepted at the annual meeting of the Company held on Aug. 28. It was stated that the Corporation had acquired 90% of the Company's shares.

Bilston Flower Show

August 6 and 7



The glories of floodlighting as a result of carefully positioned gas lamps was well demonstrated on the occasion of the Flower Show at Bilston on Aug. 6 and 7. The grounds were floodlit by twenty 10-light alignment lamps with special slatted reflectors, supplied by Messrs. W. Parkinson & Co., Birmingham. The accompanying photographs will give some idea of the result, which was acclaimed by many of the visitors as " the best ever."

A Midsummer Competition in Gas.

West's Gas Results.

Messrs. West's Gas Improvement Company, Ltd., now announce the results of the competition organized by them in connection with the house journal *West's Gas*, for articles on Coke, Technical Control, Industrial Gas, Gas in the Home, and Tar, which was open to all members of the Gas Industry throughout the world.

Mr. George Evetts, M.Inst.C.E., M.Cons.E., who was called in to act as adjudicator, was presented with a batch of home and overseas entries reaching 62 in all. He found them all to be exceedingly interesting and many to be full of good points. After long consideration, and taking other opinions where Mr. Evetts thought such a course desirable, the following awards were made:

GROUP 1.—" COKE."
First prize:
J. F. LORD, Darlington.
Second prize:
F. M. H. TAYLOR, London.

GROUP 2.—" TECHNICAL CONTROL OF THE GAS-WORKS."
First prize:
T. B. GLOVER, Buenos Aires.
Second prize:
A. MCDONALD, Motherwell.

GROUP 3.—" INDUSTRIAL GAS."
Bracketed for first prizes:
J. E. WHITE, Newcastle-upon-Tyne.
W. HIND, Coventry.
Second prize:
" P. C. L.," London.

GROUP 4.—" GAS IN THE HOME."
First prize:
F. C. K. CROCKETT, Toronto, Canada.
Second prize:
EILEEN MURPHY, London.

GROUP 5.—" TAR."
First prize:
R. S. ANDREWS, Melbourne, Australia.
Second prize:
A. T. BROWN, Sydney, New South Wales.

The winning papers entered by each of these authors will appear in the Special Competition Number of *West's Gas*, which will be published during the present month and circulated to all entrants as well as to all the principal gas undertakings of the world. Mr. Evetts' detailed report on the Competition will also be included in this number.

An Improved Air Thermostat.

Messrs. Perfecta Gas Thermostats, Ltd., London, W.C. 1, announce the design of a new, improved type air thermostat for use in connection with a gas central heating system. Employed with a " Perfecta " relay control valve, it will act independently of the boiler thermostat, maintaining any pre-determined room temperature. Quicker action, greater accuracy, and neater design are a few of the improvements claimed. Another feature is the protecting cover which obviates damage or interference by unauthorized persons.

Gas Progress in Norway.

Bergen Records Steady Advance.

Some interesting details are available regarding the progress of the Municipal Gas Department of Bergen, Norway, during the financial year ended with June last.

The sales of gas during the twelve months showed an increase of 7 million c.ft., or about 1·8%, having reached an aggregate of 391 million c.ft., as compared with 384 million c.ft. in 1932-33. Of the total, 342 million c.ft. were disposed of to the public through meters, while 49 million c.ft. were used for street lighting purposes, both these totals having participated in the advance. The gross annual output of the works remained steady at about 477 million c.ft. The difference of 86 million c.ft. between production and sales is to a large extent explained by the fact that, due to the relatively high prices ruling for coke, a certain quantity of gas is being employed for the heating of the retorts.

As a result of the high prices charged for coal immediately after the war and during the following coal strikes in England, the price of gas in Bergen had to be increased to such an extent that electrical cookers were installed in practically every kitchen in the town. The authorities of the various communities in Norway generally naturally wanted to safeguard themselves against a repetition of such a calamity as shortage of coal and exorbitant coal prices, with the result that large hydro-electric super-power stations were erected all over the country far in excess of any reasonable demand in ordinary times. As a result, a great number of the power stations are disposing of their output at rates far below cost price in spite of the fact that much of the capital has been written off as a dead loss. In fact, taking into consideration the exceedingly low price at which electricity is at present being sold, it is remark-

able that most of the gas-works in Norway are holding their own and some are even going ahead slightly.

A Remarkable Change.

In Bergen the position ten years ago was that the public in general was convinced that gas was dead and that all street lighting would disappear within a few years. Internal gas lighting had been entirely displayed by electricity, and practically every kitchen had an electric cooker. A remarkable change has, however, taken place since then. Due to the adoption of modern appliances, the candle-power of the street lighting system in Bergen increased from 125,000 c.p. (1,465 lamps) in 1921 to 449,000 c.p. (1,495 lamps) in 1933.

The sale of gas cookers during the last few years—and specially during the last year—has been larger than ever before, and all new houses, although wired for electricity and with probably one electric hotplate in the kitchen are now almost invariably supplied with gas cookers.

Part of the success in this direction is due to the continuous efforts which have been made to keep the advantages of domestic gas appliances well to the front. The Department has for some years maintained a conveniently situated gas showroom in the town, in which examples of the most modern gas appliances are attractively displayed.

The Bergen Gas Department is in a strong position, and for a number of years past has been able to meet the cost of all extensions out of the annual surplus instead of by additional loans and is still able to hand over each year a certain amount for the relief of the local rates.

Developing the Load Factor

Taking Advantage of the New Gas Undertakings Act

By Cecil H. Chester, General Manager and Secretary, Swindon United Gas Company

After many years of agitation and patient waiting, the Gas Industry has at last been afforded some liberty in its method of charging for gas which will enable it not only to be better equipped to compete with electricity, but to develop its load factor on pre-determined lines, based on the scientific knowledge of an undertaking's engineer who has carefully studied this particular business and prepared suitable load curves. The ideal may be unobtainable, but we have a wonderful future before us if we plan salesmanship and price together.

Much has been written by admirable pioneers of tariffs and block charges, but a consumer will always require to be convinced these are not other means of getting new business at old prices wrapped up in carefully grouped figures which are only understood by the seller. There is now available a two-part tariff meter which will give direct indications to satisfy this ideal. The writer has been studying ways and means over the past two years to fill up the gaps in the load factor. For example, 60% of the gas sold during the hot spell in summer was distributed in the three cooking hours from 10.30 a.m. to 1.30 p.m., and the sales of gas from 11 p.m. to 6 a.m. were negligible, representing less than 2½%.

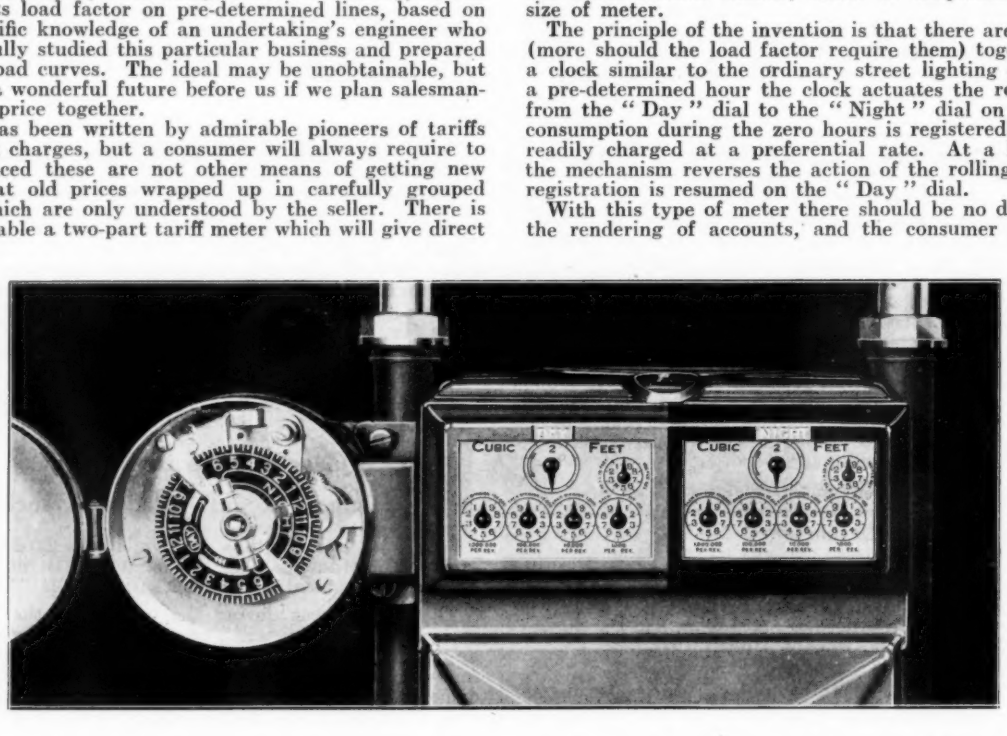
The development of the industrial load has received concentrated thought, but the lack in the number and variety of industries, and the fact that the largest industry in the town makes its own gas, have made it difficult. The writer conceived the idea that if one meter could be offered to a consumer which would record gas at different costs at different hours a larger development would accrue in the small industries, and that later on one could readily conceive a building-up of private consumption if household consumers were approached with suitable apparatus and a meter to encourage them to burn gas at other than peak hours.

One example of this would be a comparatively large consumption thermal water storage heater wherein the gas would be used principally during the night time.

The meter and mechanism which the writer evolved in conjunction with Messrs. George Wilson Gas Meters, Ltd., is shown in the illustration. Simplicity and position were the main features desired, added to adaptability to any size of meter.

The principle of the invention is that there are two dials (more should the load factor require them) together with a clock similar to the ordinary street lighting clock. At a pre-determined hour the clock actuates the rolling gear from the "Day" dial to the "Night" dial on which the consumption during the zero hours is registered, and thus readily charged at a preferential rate. At a later hour the mechanism reverses the action of the rolling gear and registration is resumed on the "Day" dial.

With this type of meter there should be no difficulty in the rendering of accounts, and the consumer will know the amount he has burnt at different periods of the day. One may also foresee the development of an evening heating load in a good-class artizan town through a prepayment meter of this type.



The strength of the argument, in the hands of a skilful salesman, when gas can be sold at very low figures during certain parts of the day would be overwhelming, and although the meter has only been placed on the market something less than a month it has enabled me to obtain business for baking purposes equal to 1% of the make of the Company; and many other inquiries are being dealt with. I know the manufacturers have already supplied several of this type of meter, and all are giving complete satisfaction. The price of gas ranges from 6d. to 1s. per therm for different periods, but, of course, any variation of these figures can be made where gas is available at a lower rate than in Swindon.

The business is there to be had for the engineer-salesman with a bold policy who has behind him a board of directors who appreciate the strength of the argument. The load-factor sales policy is definitely the right one.

INTERNATIONAL GAS UNION

Second International Conference, Zurich, Sept. 1 to 4.

By airmail we have received from Clifford A. King, who is attending the Conference on behalf of the "JOURNAL," the following account of the early proceedings. This is followed by the Report presented by the Institution of Gas Engineers, the Paper contributed by Mr. Clifford E. Paige, U.S.A., and digests of Reports submitted by National Bodies of other countries.

En route to Zurich, one's thoughts naturally reverted to Institution Week, 1931, when the Gas Industry of the world was invited by the Institution of Gas Engineers, under the Presidency of Mr. Harold E. Copp, to a First International Gas Conference. Over 1,500 delegates in all were registered at that meeting of our Institution, and no fewer than 21 nations were represented. On June 3 they witnessed, as the late M. de le Paulle (his wit and gift of tongues will be greatly missed) said, the birth of a healthy child—the International Gas Union. The creation of the Union had first been suggested by M. A. Baril (Past-President of the Association Technique de l'Industrie du Gaz en France) in 1930; negotiations had taken place, and a charter of rules been drawn up; and the scheme came to fruition, as stated, under our auspices. For the first triennial term Herr Dipl. Ing. Fritz Escher, Director of the Municipal Undertaking of Zurich, was elected President, and M. Pierre Mougin, of Paris, accepted the responsibilities of General Secretary. The Headquarters of the Union was fixed in Paris.

Great Britain is a Council Member of the Union, and has been represented on the Council hitherto by Mr. Copp and Mr. Alexander; but in view of his impending retirement, Mr. Copp has felt obliged to tender his resignation as a Vice-President of the Union and Member of Council. Mr. Valon Bennett will act in his place pending the formal election of a successor.

The list of British delegates was published in the "JOURNAL" for Aug. 22 last. Unfortunately Mr. and Mrs. Mitchell since found it necessary to cancel their attendance. However, though the party is not as large as had been hoped, it is nevertheless quite fairly representative, and fully capable of doing justice both to the varied intellectual fare and to the alluring programme of visits and social functions.

One other comment as a preliminary to our review of the proceedings. The programme, as we remarked some weeks ago, bears the unmistakable stamp of the Institution; and we can already testify to how helpful it has been. We know that many hours were devoted to it by Mr. Alexander, and, further, that his personal advice has been invaluable to the Swiss and French officers in arranging the complicated time-sheets. It is interesting to note that the four alternative routes to Zurich were all used. Fifteen delegates travelled via Paris, six by Harwich and down the Rhine, seven by air, four by Laon, and the remainder by independent route. Most unfortunately the Paris party, which included the President and his wife and Mr. Pat. Bennett, were delayed by a derailment of trucks near Belfort, and consequently suffered considerable inconvenience; but otherwise everything went according to the book of words.

61ST ANNUAL GENERAL MEETING OF THE SWISS SOCIETY OF GAS AND WATER ENGINEERS.

The first Session of the International Union was not till Sunday, but a full programme was provided on Saturday by the Swiss equivalent of our Institution, who had invited all the delegates to attend their 61st Annual Meeting. This was held in one of the handsome lecture theatres of the magnificent Federal Polytechnic School, and was under the Presidency of M. A. Dind, of Neuchâtel.

Some 250 were present when M. Dind rose to welcome the visitors, and he was promptly succeeded by the representatives of other countries. Speaking on behalf of the Institution of Gas Engineers, Mr. Valon Bennett acknowledged the very hearty welcome, particularly thanking the Swiss Society for the invitation to their meeting. He was sure that all would have a happy and instructional meeting. Though his remarks might be brief, they were none the less sincere.

Acknowledgments were also made by the leaders of the German, French, Italian, Polish, Belgian, Czecho-Slovak, and American delegations.

After routine business and acceptance of the reports of the various technical Committees for the past year, the meeting proceeded to the election of Herr M. Thoma, of Basle, as President for 1934-35, and then to the presentation of a number of long-service Diplomas to workers in the Industry. Considerable enthusiasm was roused when Prof. Schläpfer was asked to accept an illuminated parchment in recognition of his long association with the Polytechnic.

A Survey of Coke Oven Heating Technique.

By Dr. P. SCHLÄPFER, Professor at the Federal Polytechnic of Zurich.

During the last ten years the Gas Industry has evolved along the lines of not concerning itself solely with obtaining a large volume of gas of constant quality, but with providing also a coke capable of replacing metallurgical coke for central heating and other purposes. Such an objective has demanded the judicious selection of coals and modification of the methods of carbonization. Gas-works are using to a growing extent chamber ovens, as in coke oven works.

Prof. Schläpfer in his paper dealt with heating phenomena in carbonization and coke production, and their influence on the construction and technical and economic factors in the working of the settings. For a given temperature of the heating flues, the progress of the coking action depends upon the rate of heat transmission; and this relationship influences the design of the chambers and the heating.

The author emphasized by examples certain essential points in the selection or plant, especially with a view to co-ordinating their working with other heat using plants on a works. The engineer must never be influenced by a single advantage of one particular type of plant; his considerations must embrace the problem in its widest aspects.

Carbonization on the Screen.

There was no discussion upon Prof. Schläpfer's paper, and the meeting went straight on to a novel entertainment. This was in the form of a micro-ciné film of carbonization, coking, and coke combustion presented by Dr. Baum, of Berlin. It is not possible to offer any description of the film, but one was left wondering how patiently inventors, operators, and research workers must have toiled to achieve so wonderful a result.

The Schlieren Works.

In the afternoon a special train conveyed the party to the Schlieren Works of the Zurich Corporation, where they were divided "by tongues." Our own guide was Herr E. Otte, Assistant Engineer, from whom English, German, or French, technical and otherwise, flowed with equal facility.

The works were built in 1898 to replace the smaller ones within the town, and considerable alterations and extensions took place between 1928 and 1933. Now it is capable of producing nearly nine million cubic feet a day, and serves a district with 400,000 inhabitants. The main gas-making plant consists of Koppers coke ovens—open to the sky, in strong contrast to much of the other works plant, a siding, and telpher track which are covered by a tremendous span of roof.

Particular interest was shown in the coal blending plant, in the Sulzer dry quenching system, and in the coke grading plant which at present is being elaborated; and it is

hoped some time to be able to publish an extended account of these and other features.

The present output of the station is almost 2,082 million cubic feet of gas per annum.

On the completion of the tour, a typical Continental repast of the nobler types of ham sandwich and lager beer was provided in the " Men's Institute; " and back we went to Zurich.

A Conversazione.

To welcome the Conference and let there be no mistake that gas was having an innings, the bridges and many architectural features of the town had been floodlit, and very beautiful they looked among the myriad lights that always border the lake. Unfortunately a torrential downpour supervened between 9 and 10 p.m. This in no way impaired the flambeaux which burned cheerily along the bridge, but it must have kept many thousand citizens within their doors.

Meanwhile the delegates foregathered at the Kursaal for an informal reception and dance; and a programme of solo music and folk singing added to the amusement.

PRESIDENT OF THE UNION.

During the day the Council of the International Union had met and had elected as President for the next three years M. A. Baril, Director of the Compagnie d'Eclairage, Chauffage, et Force Motrice, of Paris. Holland had also been honoured by the election of an additional Vice-President in the person of Prof. Brender à Brandis, of The Hague.

(*To be continued.*)

Methods for the Development of the Use of Gas for Domestic Purposes

Report by the Institution of Gas Engineers.

1. Introduction.

Investigations have shown that as far as sales policy is concerned the progressive gas undertakings of all countries have many features in common. Such differences as exist may be ascribed to local variations in social, economic, and climatic conditions. A complete account of sales methods in each country would therefore involve much repetition and the inclusion of details which, though interesting in themselves, would be quite out of place in the general scheme of this International Conference.

The aim in this Report, therefore, is to present a clear picture, unclouded by detail, of the main sales methods which have been successfully used in greater or less degree by prominent gas undertakings in every country.

2. Appliances.

The domestic consumer of gas is very generally encouraged to expect that gas appliances will be subjected to severe tests for efficiency and safety before they are put on the market. In certain countries (such as the United States of America, France, Canada, and Sweden) the appliance which satisfies these tests receives a seal of approval from the national organization which determines the standards.[1] The methods of testing gas appliances are dealt with in another Report to be delivered at this Conference, but it is appropriate here to mention that the establishment of high standards of appliance-testing is of much value in securing the goodwill of consumers.

The appearance of domestic gas appliances varies from one country to another. They have been developed to meet local taste and local conditions of living. It is nevertheless possible to distinguish the general lines upon which appliances are being improved in every country.

The general development is towards ease of control, artistic design, and better finish of appliances. In these respects the competition of electricity, which was free to work out its own traditions in accordance with the changing conditions of to-day, has served to stimulate the imagination and inventive faculties of the Gas Industry. An American writer has not hesitated to attribute all the recent remarkable improvements in domestic gas equipment to the keen competition of the electrical industry.[2]

The whole tendency has been to make gas appliances simpler and more convenient for the user. The readiest instance of this is the application of thermostatic control to the ovens of cookers and to water heaters.

The logical development of thermostatic oven control is the use of clock control for the switching on and off of oven heat at predetermined times. This advantage at present entails some extra expense, but as its convenience is recognized and the demand grows the price will inevitably fall.

The pilot-light principle has been successfully applied to the cooker hotplate. The pressure of a finger on a spring tap produces four or five long jets which ignite the gas at any burner of which the tap is turned on.

Automatic control of water heaters is a parallel development. The principle of the automatic water heaters is that the amount of gas consumed is precisely balanced against the amount of hot water used. This is the case both with automatic storage water heaters and automatic instantaneous heaters of the type first used in Germany and now extending its popularity in other countries.

In all countries there is a strong feeling that automatic water heating offers the best chance of increasing the gas load. In one American city statistics show that a quarter of a million automatic heaters of the coil and storage type are already in use.[3]

Vitreous enamel finishes have been used on many appliances. Many colours are available to suit all tastes and all colour schemes of interior decoration, and the new finishes make the cleaning of appliances a far easier task.

Simultaneously there has been a simplification in the design of appliances. Instances are the instantaneous heater, the cooker with totally enclosed shell, and the gas fire or radiant heater. In Great Britain the views of a number of leading architects were elicited before the panel fire was designed and put on the market.

The parallel development of all types of gas appliance has led to an attempt to sell gas kitchen equipment as a whole, each separate appliance being regarded as an essential unit of the complete plan. For this reason it becomes increasingly necessary to give a harmonious appearance to all gas appliances which are likely to be placed in juxtaposition. The logical development of this idea is found in the " kitchen compact "—a steel unit piece of furniture which comprises gas cooker, refrigerator, water heater, and central heating boiler, as well as a sink and adequate cupboards.

Meanwhile the range of gas appliances is steadily being extended to meet all the demands for heat which occur in the work of the home. First among the newer appliances comes the gas refrigerator, the essential complement to the gas cooker. Other appliances which increase the load and help to keep electricity out of the kitchen are automatic sink heaters, radiators and portable fires, airing and drying cupboards for clothes, and the Swedish cooking cabinets which maintain hot food at a constant temperature.

3. Personnel.

In some countries a large proportion (rising sometimes to 50%) of the work of selling and installing gas appliances is undertaken by plumbers and gas fitters employed by private traders. This co-operation with dealers ensures a strong selling service for gas outside the organization of the gas company itself.

In one case a special class of tradesmen-fitters has Governmental authority to carry out all gas installations without exception.[4]

In other countries the gas undertakings prefer to handle most of the selling and installation work through their own staff. They are thus able to ensure that each installation is carried out in a uniform and adequate way.

In spite of these differences of policy, there is a very general realization of the need for training gas salesmen and fitters both in the technical aspects of their work and in the art of selling.

Technical training is given mainly in the workshops and laboratories of the undertakings; it is often correlated with classes in technical schools and planned on a definite scheme laid down by the national association which is constituted as an examining body.

No less important is the training in salesmanship which will ensure that the individual knows exactly how to use his general and technical knowledge in the actual business of getting orders and keeping the goodwill of present consumers.

Such national schemes of sales-training as are already

in existence are based on a dispassionate objective investigation, which aims at gathering all the facts relating to the sales of gas appliances. These facts are gathered, firstly, by men and women who visit showrooms ostensibly as shoppers, but really to observe selling methods; secondly, by interviews with sales managers and appliance manufacturers; and, thirdly, by visits to gas consumers.

The mass of material thus gained is consolidated and analyzed, and is the basis of the course in salesmanship, which includes standard text-books, periodical examinations conducted by post, and salesmen's meetings where selling methods are demonstrated and discussed.

Simpler schemes are operated for the benefit of gas fitters, who are required to attend a course of lectures. This is regarded as a most important activity by many undertakings, as the fitter is the best-known point of contact between the consumer and the gas company, and the consumer's attitude is necessarily coloured by the degree of courtesy and helpfulness which the fitter displays.[5]

There are many points of similarity between the training schemes operated in America and Britain. In Germany the Central Office for the Exploitation of Gas provides courses of instruction not only for domestic staffs, domestic science mistresses, and women engaged in propaganda work, but also for plumbers and fitters, chimney sweeps, fire brigades, and building officials.[6]

It may be said in general that the qualifications, standing, and remuneration of gas salesmen are continually improving. Commission on the sales of appliances is a general practice, and very many undertakings give commission to all employees of whatever description who introduce new business for gas among their friends and acquaintances. This encouragement of all employees to become salesmen in their spare time has proved an excellent method of increasing revenue.[7]

The recruit to the sales staff has good prospects of promotion in most cases, many undertakings having introduced systems by which better posts and increased pay are automatically given to salesmen with the best selling records.[8]

The British plan of making all employees co-partners in the business, with a personal interest in its welfare, has proved extremely successful, and, *inter alia*, tends to prevent the turn over of trained salesmen to other trades.

4. Market Surveys.

Detailed market surveys as a basis of selling activities are common to all countries. Such surveys are usually designed to elicit the following information:

(1) The proportion of the whole heating field which is already in the gas company's possession.
(2) The proportion held by competitors.
(3) The potential uses for heating which are not yet supplied by anyone.
(4) The sectors which are threatened by competitors.

When this information is consolidated and analyzed, a scientific selling policy can be formulated.

The methods of obtaining the information necessarily vary according to the personnel available. In some cases a special group of company employees has been used. This method ensures quick results, but if these results are to be accurate the most careful instruction and supervision are necessary.

Meter readers have been employed on survey work. It has been found that this method also entails inaccuracy unless special measures of supervision and compensation are introduced.

Appliance service men are sometimes used for making the survey. The disadvantage of allowing such a maintenance man to operate the survey is that he is capable of maintaining an appliance which is no credit to the undertaking because it may be inadequate or out of harmony with the surroundings. For this reason it has been found best, whenever possible, to employ a technically-qualified salesman for this work, because such a man, gaining the privilege of welcome access to the consumer's premises, is able to give advice and help and in many cases to obtain sales which will go far to cover the cost of the survey. This method takes up more time than the others, but in the long run is more satisfactory.[9]

The visit of the "surveyor," who is thus a maintenance man and salesman combined, is preceded by a letter from the company telling the consumer that his gas appliances are to be inspected to ensure their efficiency. The salesman lights up and tests all appliances, and recommends and arranges for any repairs. He then takes a "census" of certain details regarding the consumer's premises and appliances; these are entered on a card which becomes the basis for future canvassing and advertising campaigns, serving as a target to be fired at until further sales are obtained. Lastly, the salesman tries diplomatically to make sales, though he is instructed that he must never convey the impression that he has been sent out merely to solicit orders.

By this system two birds are killed with one stone. Out-of-date and inefficient appliances (which offer an opening to competitors) are displaced in favour of new ones, and at the same time a mass of information is built up to enable the sales manager to organize his selling campaigns with the least possible waste of effort and the most forcible effect.

5. Showrooms and Service.

It is true of most countries to say that gas showrooms are more numerous and better equipped to-day than ever before.

This is partly due to the necessity of meeting the forceful selling methods of the electrical industry (electricity appliances are universally on sale; gas appliances generally only in gas showrooms). But it is due also to the realization that the Gas Industry at its present stage of development is competing not only with other fuels, but also with other industries (such as the motor car and radio trades) for the customer's money. In other words, it is selling the convenience of gas appliances against the possible pleasures of motor cars, radio sets, and innumerable other modern products. If it is to sell successfully, it must adopt the most up-to-date sales methods common to other forms of business enterprise. The showroom is one of these methods, and all progressive gas undertakings endeavour to make their showrooms as bright, attractive, and genuinely useful as the modern department store.

Thus it is a common practice to have a hall or theatre attached to the showroom at which cookery demonstrations and lectures are regularly given. In certain cases each person who attends the demonstration is given printed recipes tested by the gas company's demonstrators. Special cookery classes are often given to business girls, husbands, and bachelors.

Another valuable improvement is the installation in the showrooms of model automatic all-gas kitchens which may be used to show consumers how their individual kitchen-planning problems may be solved by gas service. In some cases the model kitchen is fitted in a travelling showroom or van.

This is symptomatic of the growing belief that the best way of leading a housewife to the purchase of any gas kitchen appliance is to interest her first in the kitchen itself, by demonstrating to her that the ideal labour-saving kitchen is only made possible by the planned use of gas appliances.

This line of thought, logically pursued, has led certain undertakings to a further development. Having secured the interest of a prospective customer they supply her with architect's floor plans, working blue prints, and colour sketches of her own kitchen as it would appear if scientifically planned with gas appliances. This has the effect of building up in the customer's mind a picture of how her kitchen could be improved, and by a natural train of thought she associates kitchen improvement with the work of the gas company. Her goodwill as well as her custom have been gained by this enterprising method. Instead of thinking of separate appliances which can be operated by other fuels than gas, she begins to visualize gas service as a whole—the most convenient way of preserving and cooking food, of heating water, and of warming rooms.[10]

Home Service (the most usual term for this form of propaganda and selling) comprises other activities which are mainly in the hands of women.

After the purchase of a gas cooker, for instance, a cookery demonstrator visits the house to give the housewife every possible help in becoming expert in its use. It is usual also for a demonstrator to attend at the show house on new building estates, in order to give assistance and make sales to prospective house-buyers.

Home Service employees are required to keep in close touch with influential classes of the community, such as builders, architects, doctors, teachers, &c. They must also display activity in the social life of the district, especially by taking part in the meetings of local societies and clubs, giving lectures and radio talks on the use of gas whenever this is possible. In certain cases these local societies are invited to use the gas showrooms for their meetings, when there is an opportunity for disseminating gas propaganda.

Another important aspect of Home Service work is the gas company's contact with local schools and institutes where domestic science and housewifery are taught. The appliances which are used for the training of pupils are frequently lent free of charge to such schools, and are maintained in the best condition. This is an important service,

for the attitude of future consumers will depend largely on their experience of gas during their period of training.

National Women's Gas Associations are sometimes established to exploit Home Service to the full.

6. Advertising.

The importance of advertising as an integral part of sales policy is now generally recognized throughout the Gas Industry. The fact that the Industry is a public utility is an additional reason for advertising its service in the same way as does any other producer. In the first place, the Industry, by virtue of its modified monopoly, is morally bound to extend its service to the community until every individual consumer or potential consumer is fully aware of the advantages which gas can give; and advertising is one way of achieving this object. In the second place, there is a tendency among the public to regard all utilities and large corporations, including the Gas Industry, as inhuman and bureaucratic. Advertising is the easiest way of breaking down this prejudice against the supposed " officialism " of the Gas Industry.

Investigations have shown that in general the advertising activities of the Industry are entrusted to professional publicists.

Advertising is put out, broadly speaking, from three sources. In the first place, there is the advertising produced by the manufacturers of appliances, who commonly take space in newspapers and magazines and in addition produce booklets, catalogues, and window displays for the use of gas companies and appliance dealers.

Secondly, a large proportion of gas undertakings in each country produce individual advertising matter, in which they are able to state the special terms, prices, and tariffs which apply to their own particular districts. Adjoining companies with similar sales policies are known to work co-operative advertising schemes by means of which overhead costs are much reduced. In some countries, notably in America, radio broadcasting and advertising films are employed.

Thirdly, there exist national advertising schemes operated by a central organization to which the constituent undertakings subscribe on a basis of gas output. In such cases the revenue is spent in national newspapers and magazines, though in certain circumstances a proportion of revenue is allocated to newspapers with a purely local circulation.

Advertisement matter prepared by national organizations cannot be expected to state the varying sales policies of the different undertakings which subscribe. Its main object, therefore, is not so much to secure immediate sales as to provide a general background for local, individual selling efforts. It helps to break down " consumer-resistance " to sales, which often exists in the form of prejudice against gas because of electrical bias.

National organizations for advertising gas have this further justification, that by ordering in bulk they are able materially to reduce the cost of pieces of advertising literature, posters, displays, &c., to a price far below that which could normally be obtained by an individual gas undertaking. Their members are thus able to buy at a very cheap rate advertising booklets and magazines advertising gas. The value of women's magazines in which the advantages of gas are emphasized is very widely recognized. In some countries these specially-produced magazines are bought from the central organization by the undertakings and distributed free of charge to their consumers. In other countries where the magazines are very highly developed editorially, they are sold to consumers by the gas fitters, who receive a small commission on each subscription they obtain.[11]

It is notable that gas advertising in general subordinates cost comparisons to guarantees of satisfactory performance and to claims that gas is up to date, quick, clean, reliable, and easily controlled. It is recognized that low price will never sell any appliance unless the desire and need for gas service is created first of all. " It is our job to tell the people what they need, why they need it, and finally to teach them that if they want to live decently, they have got to have it."

A further notable feature of current gas advertising is the successful attempt to meet electricity on its own ground by presenting the case for gas in a fresh and engaging manner. A more human approach has replaced the pompous announcement which was once common. Humorous touches are in evidence in many of the advertisements inspected.

Many of the ideas used in local gas advertising are capable of universal application. It is suggested therefore that this International Conference may appropriately consider the establishment of an international exchange of gas advertisements. Each country would periodically circulate copies of its advertising matter to the national organizations or leading gas undertakings of other countries. By this means a common fund of advertising ideas, constantly replenished, would become available to all gas advertisers. In the result we might reasonably expect even more freshness in the treatment of gas advertisements. No complicated organization would be necessary to effect this constant interchange of advertising material, which is all directed ultimately to the same object of selling gas. Finally, the scheme would have the advantage of making every advertising man in the Gas Industry take a wider view of the scope and ramifications of our common business.

AUTHORITIES.

[1] Testing and Sealing of Appliances: Reports of American Gas Association, *passim*. A. Baril (France); G. H. Hultmann (Sweden).

[2] W. Frank Roberts (Baltimore) at Atlantic City, 1932.

[3] T. Carmichael (Great Britain), 1934.

[4] "Gasmestre" in Denmark have a legal monopoly in gasfitting work. Dealer-co-operation is treated in Reports of the American Gas Association.

[5] Training of Salesmen. Sir Francis Goodenough (Great Britain).

[6] Dr. Karl Bunte (Karlsruhe).

[7] Employee Co-Operation. American Gas Association Proceedings, 1932, pp. 443-450, an interesting discussion.

[8] Methods of Promoting Salesmen. H. C. Creasey (Great Britain).

[9] Market Surveys. H. C. Creasey (Great Britain); Walter Routledge (Cincinnati, U.S.A.); Boxhall James (Great Britain) finds that the cost of a complete census of consumers' premises was more than covered by sales of appliances during the period in which the survey was made.

[10] Kitchen-Planning. Kathleen Atkinson (Providence, U.S.A.) published in 1933 an extremely clear description of this service.

[11] Co-Operative Publicity. The Society for the Development of the Gas Industry in France, which is responsible for all kinds of national propaganda, publishes the celebrated *Gazette du Foyer* to which gas consumers subscribe. In Germany, Gas Consumption, Ltd., prepares literature and explanatory material. The American Gas Association operates an Art and Copy Service for its members, and issues promotional material of a very high standard, which is bought by individual undertakings and circulated free to their consumers. The British Commercial Gas Association spends large sums each year in direct newspaper advertising, and produces in addition posters, booklets, leaflets, magazines, and novelties which are bought by undertakings and distributed free to their customers. The Dutch Gas Association does excellent work in posters and leaflets. These foregoing are random illustrations; other instances of co-operative gas advertising could be cited.

[12] 1933 Committee Report on Water Heating, American Gas Association.

Systems of Carcassing Buildings

Report presented by the Schweizerischer Verein von Gas- und Wasserfachmännern.

The report describes and compares the precautions current in a number of countries for the assurance of satisfactory service and security in domestic gas installations. The countries concerned are Great Britain, Austria, Belgium, France, Germany, Holland, Italy, Poland, Sweden, Switzerland, and the United States of America. In most cases, the information was received in response to a questionnaire addressed to institutions affiliated to the International Gas Union.

It is evident, from the report, that practice varies very widely in the individual countries. This fact renders the report all the more valuable. Undoubtedly, some countries are over-cautious in one direction or another, while others leave too much to chance. The report may lead to a greater measure of uniformity in the future.

Practice in the framing of safety regulations, so far as the domestic consumer is concerned varies in different countries. In some countries, rules are laid down by the government or the local authority; in others, the National Gas Institution is responsible; in others, the task is left to the individual gas undertaking.

Safety precautions discussed in the report cover the specification of suitable material (in general, wrought iron) for the carcassing; specifications correlating the diameter of services and the gas consumption; specifications for fittings, cocks, threads, unions, and jointing material; regulations for the absence or presence of taps on appliances depending on whether solid or flexible connections are installed; provision for pilot burners where necessary; the avoidance of regulating devices capable of

being adjusted in such a way that complete combustion is not obtained; the insistence upon flues of adequate size and down-draught interceptors, bafflers, and/or cowls for appliances consuming more than a stated quantity of gas or situated in a room smaller than a specified size; rules prohibiting the connection of more than a specified number of flues to one chimney and the connection of flues to the chimney of central heating plant; provision of adequate means of ventilation where flues are unnecessary; notification of proposed installations to and their approval by the gas undertaking in cases where the work is not carried out by the company; skilled supervision of the fitting of appliances and testing for leakage; provision for the ventilation of the diaphragm of governors; instructions for the location of meters, &c., &c.

To the report is appended an extensive bibliography.

Co-ordinated Research and Co-ordinated Rate Making

A paper presented by CLIFFORD E. PAIGE, Vice-President, The Brooklyn Union Gas Company, Brooklyn, New York, U.S.A.; Vice-President, International Gas Union; former President, American Gas Association.

Research and rate making are closely related, but, like the hen and the egg, we don't know which came first. We do know that, in the beginning, both were rather crude.

Over a period of years, the chief improvement from co-ordination in research and in rate making, in the United States and Canada, has been a keener appreciation of promotional possibilities, an extension of gas service to new fields of operation, as well as a refinement and perfection of service necessary to meet any competition.

Rates are established to meet needs. Research designs and develops rates for diverse and specific purposes. Rate research is involved largely with differentials. General research involves development of economical operation; for all rate structures must pass the test of harmony and must be designed to bring in no more than a reasonable return on a fair value of the property used and useful in the business. This is usually prescribed by regulation, and competition is an equally effective monitor.

In order to present the matter clearly, it is necessary first to establish the background of general research in the Industry. The production, transmission, distribution, and utilization of gas have developed a technique incident to the peculiarities of the business. Whereas most manufacturers and producers limit their activities to single operations and depend upon wholesalers, retailers, and others to complete their services to the consumer, gas utilities must assume every role from producer to retailer and service man. The entire responsibility of serving the customer is centred in one organization, from procuring raw materials to the delivery of the finished product to the consumer in such a way as to give him complete satisfaction with his result.

The growth of the gas business has not been spontaneous. It did not spring up from a few brilliant inventions which were perfected immediately. True, public utility gas service was born very soon after the invention by Murdoch of a process for making coal gas. Likewise, the dry meter was invented in the early days of the business and still retains substantially its original form. Other instances could be cited. On the whole, however, technical development has been a slow growth. While much of the original accomplishments were born in the realm of pure science, competition furnished the impetus which brought theories to practical application.

There has been as a result an amazing acceleration in development in recent years. The pressure has been largely economic. Research has made it possible for some industries to compete for business with totally different industries. Reinforced concrete competes with steel, and gas competes with other fuels.

"Closed Doors."

Some industries are handicapped by trade secrets, mysteries, and "closed doors." An eminent scientist has said that the "closed door," usually, keeps out more than it lets in. This is being recognized, and many industries, even with intra-competing units, are more and more pooling their knowledge for the common good.

Industrial research is chiefly concerned with creating new equipment and devising new processes. One logical step after another is taken in the hope that a useful, practical result will be found. Certain problems in research may be conducted by individual companies. Problems which are common should usually be approached collectively by the Industry. This arrangement, where reasonable, assures the most comprehensive result at the lowest cost. Experience has made research on the co-operative basis an integral part of Gas Industry procedure in America.

In our country, co-operative research has centred in the American Gas Association. The membership in the Association is fully representative of the entire Industry in the United States and Canada. This makes available an enormous amount of ability operating through a single clearing house.

The various sections of the Association are constantly engaged in many kinds of investigations.

Co-operative research projects fall chiefly into two divisions:—(1) fundamental research where science in general or other industries have an interest, or (2) study conducted expressly for the development of the gas business. The American Gas Association operates in both fields.

While the Association may not control all the research in the Industry, it has an important influence in determining the relative importance of various problems and in preventing wasteful duplication. It furnishes both inspiration and leadership in the research field.

Committees of sections and general committees are continually studying technical conditions within the Industry and their relation to present and probable future economic conditions.

Information is constantly received from many sources. When it is decided that certain work needs to be done, a report is prepared describing the project, the method by which the work is to be done, who is best qualified to do it, the cost, and finally, the value to the Industry. Appropriate authority approves the recommendation, if it be found worthy, and advises an appropriation of money from the funds of the Association. If the amount involved is substantial, the matter is submitted to the entire Executive Board.

Making Contracts.

In making contracts for conducting research work, the Association does not confine itself to any one institution or manufacturing organization nor to any one section of the country. On the other hand, it does not distribute its support promiscuously. Upon each occasion for starting a research project, the committee in charge carefully weighs all the points that have a bearing on the subject. The project is then assigned to that institution which appears to be in a position (1) to get the desired results, and (2) to get these results with the least expenditure of time and money. We find, therefore, that the Association is the sponsoring organization for research projects in numerous semi-public and public institutions, as well as in the laboratories of several corporations. While quite a number of projects are carried on in the Association's own Testing Laboratory, only those research projects are assigned to it for which it is particularly suited.

The Committees of the Association which have to do with research have the assistance of members of the permanent staff of the Association. One member of the staff devotes practically full time to organizing and directing research, while others work on research matters from time to time as occasion arises. Continuous contact in the field is maintained with the active projects. As the work of the various projects progresses, and particularly at the conclusion, appropriate reports are prepared from the data that have been collected. These data are reviewed by the committees and are submitted to the Industry. Several forms are used. They may include elaborate technical bulletins, or smaller reports. Or they may consist of articles in the Association's magazine or in gas trade papers. Sometimes the results are published in the general technical press and in trade papers of heat using industries that might be particularly concerned. In other instances, addresses are made before gas meetings or before scientific and technical groups.

The conclusion of a research project is a very important period in the life of that project. If the results of a project are properly interpreted it is possible to get the maximum return from the time and money spent. If the results are not energetically and capably interpreted, research data

are sometimes filed away with little visible accomplishment. The Association's committees and their associates on the staff lay great emphasis on complete interpretation and proper dissemination of research results.

Examples of Research.

I offer a few examples of American Gas Association research. These are all truly Industry projects. They are of the type that have been undertaken by the Association because, during the normal course of events, they would not be undertaken by an individual company within the Industry. Yet, from the viewpoint of the whole Industry, they have an importance, which, as careful consideration showed, justified their being energetically prosecuted. The number of projects sponsored is too great for me to mention them all, but I shall give some typical examples.

A subject affecting production was an investigation of the gas and coke making properties of American coals. This project was carried on jointly by the Technical Section of the American Gas Association and the United States Bureau of Mines, and consisted of both field work and laboratory work. As a result of the data collected and tabulated, the several gas companies are better enabled to meet their local technical requirements for gas and coke making coals.

Several years ago, our Association decided that the fundamental principles underlying the practice of gas mixing should be investigated. A Mixed Gas Research Committee of the Technical Section was appointed. After a careful survey of available testing facilities, it was decided to assign this important problem to the Association's Laboratory in Cleveland. The experiments were initiated early in 1927 and were carried on continuously thereafter for about five and a half years.

As is known, the practice of gas mixing offers many opportunities for effecting economies in the production of city gas. Contrasted with this, however, is the fact that the methods employed must be correct and the variation of important factors satisfactorily controlled, if proper service conditions are to result. Gas mixing is perhaps of greatest interest to those manufactured gas companies adjacent to large industrial plants producing excessive quantities of bye-product gases, or to refineries, or those that are reached by new natural gas transmission lines, and to natural gas companies faced with peak load requirements in excess of their available rate of supply.

More than 175,000 separate laboratory tests were made on approximately 250 different gas mixtures. The detailed findings show the results of varying such important factors as specific gravity, heating value, gas pressure, and chemical composition. The numerous progress reports have been abstracted into the form of three summary reports, representing by far the most complete treatise on this subject that has ever been supplied to our Industry.

An outstanding feature of this study was the development of a formula that may be used by gas engineers in the solution of gas mixing problems. It is only necessary to substitute in this empirical relationship, available data and thus solve one's problem without resorting to expensive and long drawn-out field tests. Results obtained in this manner have already been verified in different sections of our country, lending authenticity to them and demonstrating the great value of this study to the advancement of our industry. This programme is now considered to have been completed.

There are several outstanding achievements in research in the Natural Gas Department. A number of years ago the department undertook an investigation of gas measurement, particularly of large volumes at the high pressures carried in the long transmission lines. Over a period of several years a very broad study was made particularly of natural gas orifice meters and their installation, with the result that there is now available very definite and useful information on this highly important subject.

In co-operation with the United States Bureau of Mines and a number of companies who contributed facilities and effort, a study was made of long high-pressure pipe line flow. The results of this undertaking were covered in a report issued in October, 1932, and are now available.

Through the co-operative effort of natural gas companies, the Bureau of Mines and the Natural Gas Department, gas well deliveries have been under study for the last two or three years. It is expected that this investigation will have been completed in 1934 and the data released then.

A programme to deal with the consideration of warning agents for gas was undertaken several years ago. The results of this effort have been valuable especially to the natural gas companies.

Soil Corrosion.

Soil corrosion in many instances has been a troublesome and expensive factor in gas mains and services. Beginning in 1929, research was begun on pipe coatings. The investigation carried on by the Technical Section of our Association is in close co-operation with a similar study being conducted by the American Petroleum Institute. These two organizations each have a research associate at the United States Bureau of Standards, and all are co-operating in clearing the results and data through the Soil Corrosion Division of the Bureau of Standards, which has a staff of trained scientists. Our research associate has done very able work in the field on the study of the behaviour of protective coatings, which are applied to pieces of pipe that are buried in various types of soils in widely scattered sections of the country. These are supplemented with laboratory tests conducted in conjunction with the Bureau of Standards. Annual reports and papers on the progress of this work are given at the Association's meetings and are therefore available for detailed study.

It is a fallacy to assume that some pipe preservative is needed in all types of soils. It is, however, of the utmost importance that definite determinations be made as to the types of soils that justify pipe coatings and also the particular coating resistant to specific soils. A great amount of money will be saved when the life of pipe, particularly steel pipe, is extended by the application of suitable coatings in soils where there is corrosion.

The trend toward higher pressures in distribution systems, together with the earth vibrations resulting from the extensive use of heavy automobile trucks during the past decade, gave rise to the necessity for improvements in pipe joints. In 1929 there was undertaken under the sponsorship of the Distribution Committee of the Technical Section, a programme which is still being continued. Most of the work has been conducted at the Association Laboratory and with the guidance of a Committee on Pipe Joints. In these researches the Committee has had the co-operation of the manufacturers of mechanical joints. The Gas Industry has to-day, available through the reports prepared by the Committee, very conclusive information regarding the merits of various types of joints and jointing materials, under various conditions of service. It is obvious that the reduction in leakage and the elimination of hazards yield a large return on the expense and effort concerned with this project.

A logical outcome of the study of pipe joints was the desire to secure some basic information on the testing of welded joints in the field. The Association's Laboratory has done considerable work in the development of a device which involves the use of a modified flux meter in conjunction with an electro-magnet. This instrument is designed to indicate accurately the character of any kind of welded pipe joint. This device, however, is not yet in a state of final perfection.

The Commercial Section has sponsored, at the American Gas Association Laboratory, research in the relative cost of cooking and heating water with gas and other fuels. The results of this work have been of great value to the gas companies. There has been an unusually large demand for the bulletins on the subject. The Commercial Section closely co-operates with the research in domestic appliances that is conducted at the Laboratory as a background for compiling the Approval Requirements for appliance testing. Members of the Section act in an advisory capacity in connection with supervising this research.

The activities of the Accounting Section do not lend themselves so readily to specific research as do those of several other sections. One outstanding achievement, however, of the Accounting Section is the development of work which has been carried on for the past five years in connection with accounting machines of all sorts. The work of this Section's Committee in co-operation with their annual exhibit of office machinery has encouraged the manufacturers to bring out many improvements that have yielded substantial benefits in the office operation of gas utilities.

Under the jurisdiction of the Committee on Industrial Gas Research upwards of twenty-five distinct projects have been undertaken. These cover the fields of metallurgy, food products, ceramics, soft metals, combustion, house cooling, &c. It has been necessary in these ventures to draw upon the skill of many specialists in these lines.

University Co-operation.

The research in fundamentals affecting metals that are processed by heat have been assigned to universities and other institutions that are well equipped and that specialize in such subjects. Those that require commercial development have been assigned to appliance manufacturers. Extensive factory tests have in most instances followed laboratory work. These have always been with the close co-operation of leading concerns in their particular field.

Under the Research Committee's supervision, walking beam furnaces have been developed and introduced into industry for operation above 2,000° F. These walking beams, which operate in connection with direct gas firing, have been heralded as an outstanding contribution not only

to advanced gas utilization, but to speeding up and simplifying some very difficult factory operations. The Committee has been instrumental in developing "Diffusion Flame Combustion," which is fast taking an important place in the heavy industrial heating field. Immersion melting of soft metals with gas is also in the same category.

This Committee is using the Association Laboratory in Cleveland for a number of the highly technical investigations. One of these is the combustion space requirements research for high-temperature furnaces. These investigations established the need of careful consideration of the actual gas burning capacity of the combustion spaces. It was demonstrated that very substantial increases are possible where proper burner equipment is used, furnace pressures suitably controlled and adequate venting facilities provided. Information on the effects of operating with reducing and oxidizing atmospheres was also obtained. This study has supplied scientific information of very great value to engineers in designing new industrial equipment. An investigation of burner noise elimination was also conducted and bulletins presenting the findings have been made available. The characteristics of burning gas with preheated air have been thoroughly reviewed. A bulletin on this subject has become so popular that it is being employed along with other Association publications by universities as a textbook and as a handbook by many of the manufacturers and industrial gas engineers.

The entire possibilities of air-conditioning dwellings and other buildings with gas during both summer and winter have been investigated by the Association. Technical work of the first importance has resulted from the work which the Association has directly conducted, as well as work it has carried on co-operatively with the heating industry. The development of complete winter air conditioning equipment by appliance manufacturers has been encouraged, and a number of such pieces of apparatus are now regularly being sold.

To supplement winter air conditioning and create year round air conditioning, with gas as the source of energy, the Association has perfected a practical process. This has been supplemented by the development of workable equipment for homes and other buildings. The possibilities of summer air conditioning are of major importance, when it is realized that house heating is gradually building up large winter peaks. The need for compensating summer load can easily be seen.

The American Gas Association Laboratory is playing an increasingly important part in co-operative gas research. This is particularly so with respect to domestic appliances. The Laboratory is completely equipped for testing and research in all fields of domestic and in some branches of industrial gas utilization. This institution, owned and operated by the Association, is located in Cleveland, Ohio, which is the centre of gas appliance manufacture in the United States. A branch testing laboratory is located in Los Angeles, California, nearly three thousand miles away, on the Pacific Coast. Natural gas, coke oven gas, water gas, and butane gas, and many mixtures are available at the laboratories. It is impossible at this time to describe the laboratories' entire list of activities, but a brief outline of the appliance testing programme, to the extent that it has been built upon research, may be of interest.

Appliance Testing.

The appliance testing and certification plan is designed to ensure the gas consuming public an adequate supply of safe and reasonably durable and efficient appliances. Emphasis is placed on safety, and no compromise has ever been made on this point. A degree of durability, which is inseparable from safety, is required, and from time to time the requirements are strengthened to ensure a gradual process of improvement leading to such an end.

Requirements for each group of appliances are prepared by committees composed of gas company engineers, appliance manufacturers, representatives of certain public and semi-public bodies. The requirements for each group of appliances are published in book form and the manufacturers closely bear them in mind while designing their devices. Before a new appliance is placed on the market, it is submitted to the laboratory, and the tests outlined in the requirements are made. If the appliance passes these tests, a certificate to that effect is issued and permission is granted to place the Seal of Approval on the appliance.

Before any change is made in the approval requirements, the Research Division of the Laboratory fully investigates the proposed alteration and its probable effect on the appliances concerned and on their performance in actual service. It is safe to say that the entire scheme of appliance certification is based on the results of sound research, supplemented by careful analyses of field conditions. Up to the present time, more than 7,500 domestic gas appliances have actually been tested and the Seal of Approval has been extended to more than 23,000 models as a result of such tests. Annual inspections are made by Laboratory representatives in the works of manufacturers making approved gas appliances. In this way, continued compliance with the approval requirements is assured.

The Canadian Gas Association has its own approval seal and issues its own listing of approved appliances.

No research programme, regardless of its size, is properly organized unless there is some means provided for exchanging ideas and information with other research organizations. The American Gas Association maintains valuable contacts through its committee organization and also through membership on appropriate committees of other technical societies. It stands ready, when occasion arises, to join with others in sponsoring research work. Such projects as are undertaken under such arrangements are usually of the broader, scientific type, designed to solve some basic technical problem that affects more than one industry.

Value of Co-operation.

It is a fair question to ask what has been the value of the co-operative research sponsored by the Gas Industry through its Association. Has it been superficial, or has it been vigorous and directed along lines that have not only fortified the Industry at many vital points, but have extended the opportunity for additional sales of gas and for the Industry to become a larger and more influential factor in supplying the heat needs of the nation?

Association research is so directed that it is not allowed to become perfunctory. The beginning and end of all research is to find ways to do things better—more safely and more cheaply. So, whether the investigations be of technical operating processes or of equipment designed for the use of gas, the justification is found when these tests are met.

Research in rate-making has grown to be a matter of great importance. Rates must be adequate to support the business, yet they must be designed to attract business. Different rates for different conditions must be delicately balanced. Questions of cost of service, cost of commodity, and cost of demand must be carefully weighed.

Scientific rate-making, however perfect, must take into account public acceptance, if the rate is to be successful. Rates which sell below cost to one group, with the expectation of making up losses by higher rates to other groups, are generally unsound.

Recognizing the importance of the subject, the American Gas Association, almost since its formation, has had two strong and active committees on rates. These committees, known as the Rate Structure Committee and the Rate Fundamentals Committee, are made up of men who specialize on rates and, for the most part, devote their entire time to consideration of the rate problems of the companies by which they are employed.

During the past twelve years, these committees have issued numerous reports on the basic principles of gas rate structure, their adaptation to the needs of the Industry, and methods of procedure in practical rate making. From a study of these reports, it might seem that the field of rate structures has been dealt with so thoroughly that nothing more can or should be added. Conditions having to do with rate matters, however, are never stationary. While the findings of the Association on the basic principles of rate structure may not change from year to year, because of their fundamental soundness, the application of these principles to current conditions has brought a succession of new rate problems.

The principles as recommended by the committees have weathered the test of time and have been demonstrated as correct. In fact, when reviewed in the light of present developments, the prophetic character of the past pronouncements of the Rate Structure Committee of the American Gas Association is revealed.

Many early policies of the Gas Industry in the United States were based on the conception that gas companies were natural monopolies. Operations were first conducted under charters, franchises, and permits granted, for the most part, by municipalities. Regulation by the states of the Union was next undertaken, wherewith it was intended, as a basic principle, that regulation be accompanied by territorial protection from competition by utilities in the same business.

Under the early conditions of regulation, when lighting and cooking service comprised the most important market, the particular type of rate structure was usually of secondary importance. A straight meter or average rate paid

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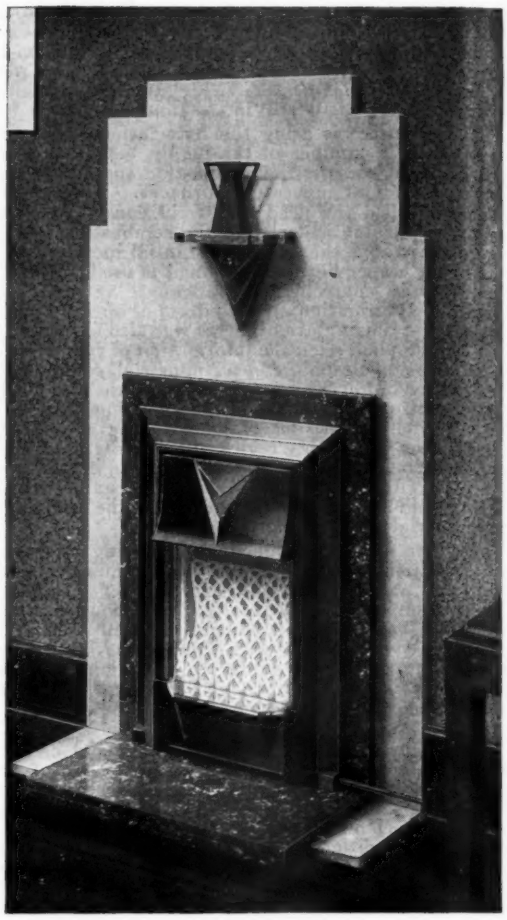

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by each customer was thought to be sufficient and satisfactory, so long as all customers paid it in an amount adequate to provide the necessary revenues.

Special uses for gas have been developed, such as water-heating, refrigeration, and house-heating. Competition with electricity, as well as with solid and liquid fuels, is becoming continually more acute.

Rates are being constantly more closely regulated. Changes in the general character of rate structures have proceeded slowly but consistently toward the types of rates which conform with the requirements of sound rate structures as recommended by the Association. Following is a brief statement on rate structure trends:

—	Jan. 1, 1925.	Jan. 1, 1930.	Jan. 1, 1931.	Jan. 1, 1933.
Number of manufactured gas rate schedules analyzed . .	1,122	2,122	2,314	2,607
Per cent. of schedules giving recognition to recommended principles of rate structure .	28·3	51·3	55·6	60·3
Number of natural gas rates analyzed	..	1,453	1,946	2,370
Per cent. of schedules giving recognition to recommended principles of rate structure .	..	18·4	25·0	30·5

In America, the problems incidental to the introduction of natural gas into communities formerly supplied with manufactured gas, with consequent large increase in heating value per c.ft., brought about a serious consideration of the therm method of charging, so generally adopted throughout Great Britain. The increased heating value per c.ft. of the natural gas results in decrease in volume consumed without a corresponding reduction in operating costs or fixed charges. Hence, rates based upon volume would have to be increased in order to maintain adequate revenue, with almost inevitable misunderstanding on the part of the public as a result. Thermal rates, based on heat units delivered, would require far less adjustment under such circumstances and appear to be more conducive to good public relations.

Thermal gas rates now have a place in the rate schedules of 46 separate operating companies in the United States serving 650 communities in 13 States. Of these, 17 companies supplying over 1,400,000 customers in 278 communities have abandoned cubic foot rates entirely. This number of customers constitutes over 9% of the total in the United States.

Rate Structure Recommendations.

The Rate Structure Committee in its 1933 report recommended that the Industry address itself promptly to the adoption of sixteen measures. These recommendations bear repetition here as they plainly indicate the present rate situation and disclose the probabilities for the future in the United States.

1. That in order to introduce successfully sound principles of rate making into general use, the entire Gas Industry unite in the advocacy of those broad rate principles which are applicable in all rate structures at any time and in any place.

2. That the effort of the Industry be directed to devising ways and means of obtaining the recognition and adoption of these principles.

3. That gas companies—both manufactured and natural—ascertain their costs by analyses, employing for that purpose the principles developed by this Committee.

4. That gas companies make customer analyses based on individual gas sales, nature of use, customer classifications, &c. Applications of various test rates of different forms, each designed to yield the same total revenue, will indicate that the form of rate which more nearly approaches the scientifically correct rate will also be the most favourable rate for the majority of the customers.

5. That gas companies make economic surveys of the cost and results of gas utilization in each customer classification as compared with other types of energy which are or may be used and from this information determine the relative value of gas service to each class of customers.

6. That based upon a broad consideration of the analyses of use, the value of the service to the customers, the cost to the company of rendering this service and general business judgment, a rate policy be formulated and a programme adopted which will result in the desired ultimate rate and rate structure. In any event a goal should be definitely established and all efforts directed toward its attainment.

7. That rate schedules for various service classifications have the greatest possible simplicity consistent with flexibility and adequate coverage of each classification.

8. Class rates may be advantageously used in many cases to supplement general service rates. When class rates are used as a temporary substitute for a general service rate the design should be such as will facilitate eventual blending into the general service rate when it assumes the desired form.

9. Optional rates without restrictions as to availability are not generally recommended. In some circumstances, however, such rates may be justified as a step in the direction of desired general service rates and as a means of educating a large cross-section of the customers to an appreciation of the advantages of the test rates. Restrictive optional schedules available under limited conditions assume the advantages and characteristics of class rates and are more generally placed in the latter classification.

10. Inducement rates are desirable only when, in form and amount, they are based on sound principles of rate structure. Rates made with the primary purpose of business promotion must especially give appropriate weight to cost analyses under the conditions which will prevail after the estimated load has been acquired. Unsound inducement rate exploitations by sellers of competing forms of energy cannot be satisfactorily overcome by the adoption of similar unsound practices.

11. When preparing the rate form and schedule those preferences of customers, which are substantially uniform throughout the Industry, should be deferred to in so far as possible.

12. Each change in condition offers a new opportunity for improvement in rate form. For example, the occasion of reductions in average rate, with increasing volume of business, usually affords a particularly favourable opportunity for needed rate structure improvement either in general or class schedules. Obviously, the nature and extent of equitable rate changes will be indicated most clearly when dealing with schedules based on sound principles of rate making.

13. Whenever rate schedules, not so based, are placed in effect despite company opposition, the committee calls attention to the necessity that a consistent and unmistakable record be made by the utility in each case. It should set forth the principles of rate making which are advocated by the company, and clearly indicate that the acceptance of the current rate schedule does not constitute abandonment of or disagreement with such principles.

14. While the field of temporary rates is outside the scope of usefulness of this committee, it nevertheless recommends that companies which are faced with industrial rate problems, arising from temporarily depressed industrial conditions, do not resort to the abandonment of established rate principles. It suggests rather that they take whatever action, with stated time limits, may be deemed appropriate in each situation in recognition of the temporary necessities of customers in such industrial classification.

15. The most effective rate work will be done when a unit of the organization, headed by an executive officer, assumes full and preferably undivided responsibility to the management for the formulation of rate policies, the preparation of data for rate cases and the development of all statistical information bearing on rates, sales policies, and related subjects.

16. Companies and individuals may differ in opinion as to systems of cost allocations and customer analyses, the exact form in which the rate is stated, and other details. Such matters are of considerable importance and are not to be disposed of lightly. However, the Committee is of the opinion that the acceptance and adoption of basically correct rate principles should not be confused or delayed because of individual preferences and opinions, and local requirements as to detail.

House Heating.

The largest and most spectacular growth enjoyed by the gas business in America during recent times has been through the introduction of house heating, particularly the heating of houses by means of boilers or furnaces located in the basement or cellar. The creation and development of this business can be said to have occurred during the past eighteen years, except for a few crude installations previously existing in certain natural gas territories.

House heating, in a broad sense, can be said to be a product of research in equipment and process as well as research in rate making. Neither by itself, no matter how skilfully handled, could have produced that particular type of business in such volume. Research in equipment devised methods for satisfactorily heating buildings with gas. As suitable rates were devised the service has been extended to thousands of homes and other buildings to the advantage and comfort of large numbers of the population. The results of research are the tools that engineering and salesmanship have used in developing this important business. The effects of research, noted in this example, apply with equal force to practically all the uses of gas. Research is the watchword, the open sesame to the future; and the Gas Industry is fortunate in having learned how to use research.

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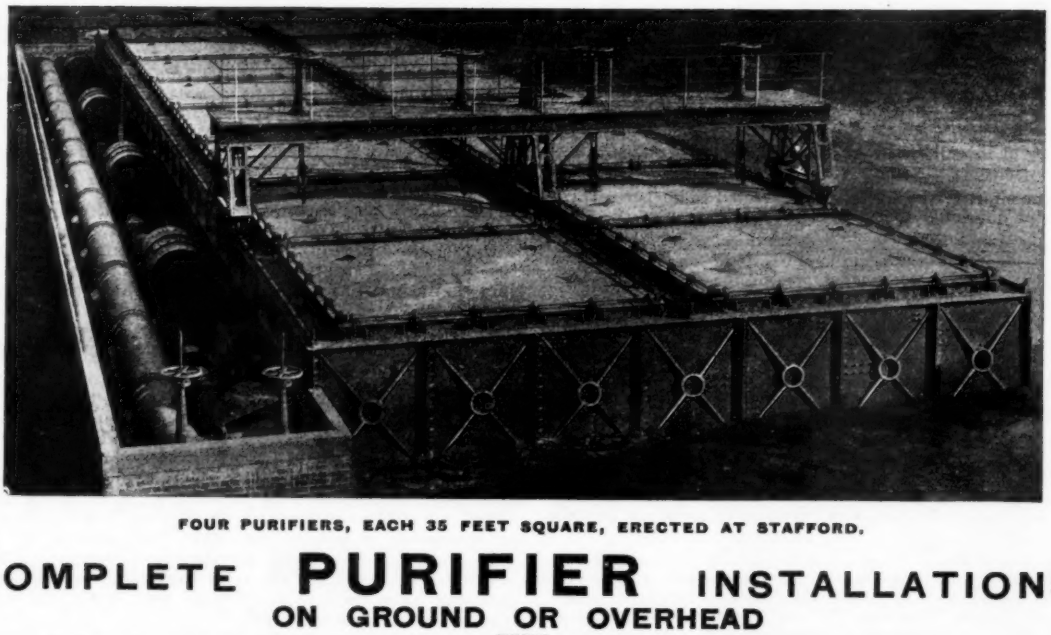

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Co-ordination of the Methods of Testing and Guaranteeing Gas Making Plants

Report presented by the Deutscher Verein von Gas- und Wasserfachmännern.

In all gas-works plant it is necessary to aim at and to demand the highest efficiency. A comparison of competing tenders is only possible if the guarantees are put forward on a uniform basis. There must also be definite rules for the execution of acceptance tests.

The existing German codes for acceptance and performance tests on carbonizing plant and outside producers formed a foundation for the present report. These were laid down by a committee representative of contractors and gas undertakings, and were adopted by the D.V.G.W. in 1923 and 1930 respectively, though accounts of performance tests on carbonizing plant had been published as far back as 1912. Apart from Holland and the United States, no other countries have codes of their own, though a number of countries have made use of the German codes.

Between 1932 and 1934, at the request of the International Gas Union, further progress has been made in Germany. The above specifications have been revised and additional specifications have been prepared, again by co-operation between contractors and gas undertakings. The specifications are divided into two groups, definitive and tentative. The definitive specifications cover guarantees and acceptance tests for (1) carbonizing plant, (2) producers, (3) water gas plant, and the tentative specifications cover guarantees and acceptance tests for (4) complete gasification plant, (5) benzole recovery plant, (6) scrubbers, (7) tar extractors, and (8) condensers (water type).

In addition, specifications issued by the German Standards Committee are available for exhausters.

Carbonizing Plant.

Basis.—Guarantees are to be based on the coal normally used, the source and the ash and moisture contents being specified. If no special coal is stipulated, a coal containing not more than 4% moisture and 8% ash is to be used. The blending proportions must be specified if more than one coal is in use and the grading of the coal, as charged, must be indicated. The gas undertaking must indicate the charging density of the coal and the density in the acceptance test must be within 5% of the quoted figure.

Guarantees are to be based on a specified thermal yield as indicated by an assay test—*e.g.*, the Geipert test. The thermal yield obtainable from the coal used in the acceptance test must not be lower than that specified. An assay test should be carried out prior to the acceptance test, if necessary by an independent authority, and, if the test is unsatisfactory, the cost is to be borne by the undertaking.

Gas Make.—The guaranteed output of the plant is to be in terms of the daily (corrected) make of gas at the stipulated charging density and moisture content of the standard coal. For static carbonizing plant, the carbonizing time is to be specified. Combustion flue temperatures for normal operating conditions are to be specified. The above guarantees are to be given for straight carbonization and/or for carbonizing under steaming conditions as necessary.

A deduction of 3% from the guaranteed daily make of gas and a similar increase in the carbonizing time may be made for each 1% of moisture present in the coal in excess of that specified. If, within the specified tolerance, the charging density differs from the standard value, a *pro rata* adjustment of the guaranteed make must be made. It is permissible for the daily make of gas to fall short of the guaranteed figure by anything up to 5%.

Gas Yield and Quality.—The guaranteed make of gas is to be expressed in terms both of a ton of standard coal and of a ton of dry ash-free coal.

The calorific value of the gas is to be guaranteed on the basis of the average gross calorific value reduced to standard conditions. The realized value must come within 11 B.Th.U. per c.ft. of this. It is permissible for the thermal yield per ton of dry ash-free coal to fall short of the guaranteed figure by anything up to 5%.

The combined content of nitrogen and carbon dioxide in the gas made may not exceed 12% and the oxygen content may not exceed 0·5%. If the latter figure is exceeded, a test must be made to ascertain whether the oxygen comes from the carbonizing plant or from the mains.

Fuel Consumption.—Fuel consumption is to be guaranteed (1) as a percentage of dry ash-free coke on the weight of raw coal, or (2) as B.Th.U. in the coke used per pound of coal carbonized, the net calorific value of dry ash-free coke being taken as 14,310 B.Th.U. per lb., or (3) as an average B.Th.U. figure (net basis) of cold fuel gas per lb. of coal carbonized.

From the weight of coke charged to the producers, a deduction may be made in respect of any coke exceeding 0·8 in. in size recovered from the producers.

Where producer gas is supplied from an outside source, its net calorific value may not be less than 110 or 136 B.Th.U. per c.ft. [30 in., 60° F., satd.] according as coke or briquetted brown coal respectively is the raw material. The dust content of such gas on the dry, tar-free basis may not exceed 4¼ grains per 100 c.ft. Where cold gas is supplied, its temperature may not exceed 95° F.

Where alternative (2) is used for the fuel guarantee, the guaranteed figure may be exceeded by 2,040 B.Th.U for each pound of water present in the coal in excess of the standard figure, the corresponding allowance for alternative (3) being 1,800 B.Th.U. Where crushed coal is carbonized in large ovens, special allowances may be agreed to. Guaranteed fuel consumption figures may be exceeded by anything up to 5%.

Where guarantees are given for the production of different grades of gas, a fuel consumption figure may be guaranteed for each grade.

Where the guaranteed make of gas and the guaranteed fuel consumption are both exceeded, the question as to the fulfilment of the guarantees is to be decided on the basis of the fuel consumption (weight or B.Th.U.) per 1,000 c.ft. of gas made.

It must be specified whether the coke is to be used hot or cold, what is to be its grading, and whether the coke is to be derived from the coal carbonized. The ash content of the coke used as fuel must not exceed 15% on the dry basis. If it does, no complaint that the guaranteed fuel consumption has been exceeded may be made.

The moisture content must not exceed 15%. No allowance for latent heat is made in the case of external producers. Where the carbonizing plant includes its own producers, an additional fuel consumption allowance of 0·125 lb. of dry ash-free coke is permissible for each pound of water.

Steaming.—Where steaming is to be practised, the pressure of the steam and the weight of steam to be used per unit weight of coal treated must be specified, a tolerance of 5% being allowed.

Life of Plant.—As the working life of the refractory materials, 1,000 days under fire from the date of heating up are to be guaranteed, or, at a maximum, a life of 5 years from the date of installation. For each shut down followed by a start up, at least 100 days under fire may be deducted from the guarantee period provided that the shut down is on operational grounds and not necessitated by faulty construction or bad quality of material. A plant is considered to be shut down if the combustion flue temperature is dropped below 700° C.

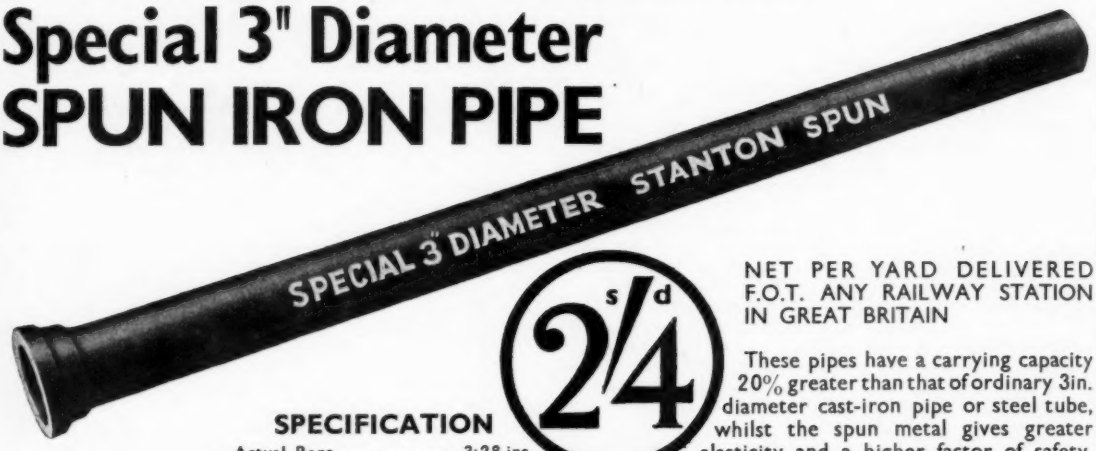
All defects within the guarantee period due to faulty construction or bad quality of material are to be made good free of charge. Maintenance costs due to normal wear, slag action, or chemical attack or occasioned by operation are excluded from the guarantee. It is assumed that heating up and operation will be conducted skilfully and in accordance with instructions and that a claim that premature failure has occurred must not be made if expanding coals have been carbonized.

The guarantee period for mechanical and electrical plant is to be 6 months (3 months where the plant is operated day and night) and 24 months for structural parts, it being assumed that the plant is put to work immediately after the completion of erection.

Plant Economy.—Economic guarantees are to be regarded as fulfilled if the over-all results are no worse than would be obtained if all the individual items were fulfilled. Market prices prevailing at the time of the tender must be used as a basis of calculation, no attention being paid to fluctuations which may have taken place at the time of the acceptance test.

Acceptance Test.—The acceptance test must occupy at least three complete and consecutive days and must be carried out while the plant is in equilibrium. Each 24-hour period must be considered separately. Directions are given for the sampling and weighing of coal and coke and for the measurement of the gas and the determination of its calorific value and composition.

STANTON DELAVAUD
Special 3" Diameter SPUN IRON PIPE



2/4 s/d NET PER YARD DELIVERED F.O.T. ANY RAILWAY STATION IN GREAT BRITAIN

SPECIFICATION

Actual Bore ..... 3·28 ins.
Thickness ..... 0·25 ins.
Length (effective) ..... 4 yards
Weight ..... 1 cwt.
Coating ..... Coated both sides, outside only, or uncoated

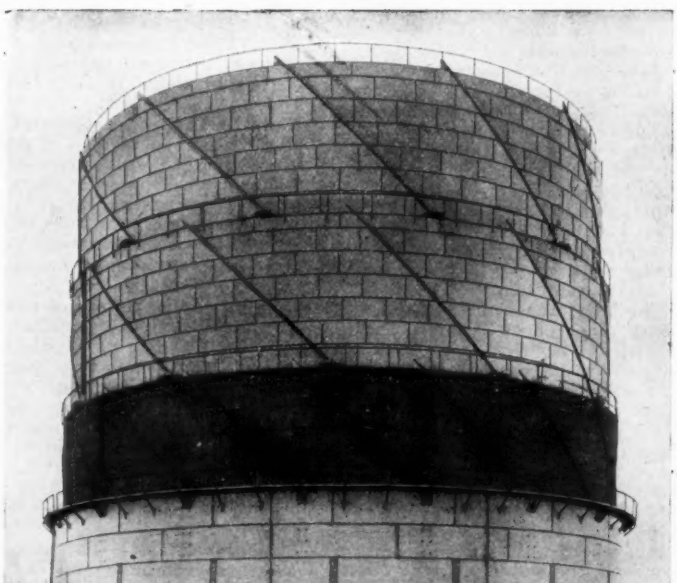
These pipes have a carrying capacity 20% greater than that of ordinary 3in. diameter cast-iron pipe or steel tube, whilst the spun metal gives greater elasticity and a higher factor of safety.

The external diameter of the pipe and the internal diameter of the socket are to British Standard specification. **All these pipes are hydraulically tested to a pressure of 200 lbs. per square inch.**

THE STANTON IRONWORKS COMPANY LIMITED, Nr. NOTTINGHAM

SAML. CUTLER & SONS LTD

ENQUIRIES INVITED FOR ALL TYPES OF **GAS-HOLDERS**



39, VICTORIA ST., WESTMINSTER, S.W. 1
Telephone No.: VICTORIA 8492
Telegraphic Address: RETORTUS, SOWEST LONDON

PROVIDENCE IRON-WORKS, MILLWALL, E. 14
Telephone Nos.: EAST 1734-1735
Telegraphic Address: CUTLER, MILLWALL LONDON

Gas Markets and Manufactures

Stock Market Report.

[For Stock and Share List, see later page.]

A cheerful start was made to the new Account on the Stock Exchange last week, and the volume of business was heavier; but towards the close markets became somewhat less active, though prices generally remained firm. Gilt-edged securities were again in demand, and some further appreciations in value took place, India stocks making the best showing on Lord Willingdon's satisfactory review of that country's economic conditions. Several leading Industrials advanced under the stimulus of recent encouraging reports, but Dr. Schacht's moratorium demands had an adverse effect on German bonds, the 7% falling to 47½ and the 5½% to 56½.

The Gas market was quiet, though most of the business done was recorded at prices a fraction higher than those of the previous week. The feature was a sharp rise of 10 points in Plymouth and Stonehouse ordinary to 179½, following a 7 point rise a week ago, and the stock changed hands at 181. At the new price the yield works out at £4 9s. 1d.%, which is very little above that obtainable on some of the leading stocks. Another increase of note was that of East Hull, which rose 3¼ to 110, the yield in this case being £4 10s. 11d.%.

At the time of writing there is a plentiful supply of ordinary stock available, though debenture issues are scarce, and with two exceptions there is very little preference stock on offer. The two exceptions are £25,000 Associated Gas and Water Undertakings 4½% cumulative preference at 21s., free of expense, giving a return, allowing for redemption, of £4 5s. 3d.%, and £23,000 Watford and St. Albans 5% preference at 124, also free of expense, yielding £4 0s. 8d.%. On the latter, 5 months' dividend is payable in February next. The list of ordinary stocks available includes the following:

Amount Offered.	—	Last Dividend % Per Annum.	Price.	Yield.
£				£ s. d.
365	Bombay	8	28s. 9d	5 11 3
200	Chertsey original	11	251	4 7 8
5,000	Commercial	5¾	123	4 13 6
850	Derby	8½	181	4 14 0
5,000	Gas Light units	£5 12s.	27s.	4 2 11
10,000	Hong Kong and China	8	30s.	5 6 8
10,000	Imperial Continental	12	208	5 15 4
5,000	Monte Video	3*	63	6 3 0
1,043	South Shields consolidated	8½	170	5 0 0
6,000	,, ,, ordinary	5¾	121	4 15 0
1,446	South Suburban	6	136	4 8 3
290	Tottenham	6¾	157	4 6 0

* Free of tax.

Current Sales of Gas Products.

The London Market for Tar Products.

LONDON, *Sept.* 3.

The prices of tar products do not show any fluctuation, but remain at the following levels:

Pitch, about 57s. 6d. per ton f.o.b.

Creosote, 4d. to 4¼d. per gallon.

Refined tar, 4d. to 4¼d. per gallon in bulk at makers' works.

Pure toluole, about 2s. 2d. to 2s. 3d.; pure benzole, 1s. 9d. to 1s. 10d.; 95/160 solvent naphtha, 1s. 7d. to 1s. 8d.; and 90/160 pyridine, 7s. to 7s. 6d.—all per gallon naked at makers' works.

Tar Products in the Provinces.

Sept. 3.

The average prices of gas-works products during the week were: Gas-works tar, 25s. to 30s.; Pitch—East Coast, 55s. to 57s. 6d. f.o.b. West Coast—Manchester, Liverpool, Clyde, 55s. to 57s. 6d.* Toluole, naked, North, 1s. 8d. to 1s. 10d. Coal-tar crude naphtha, in bulk, North, 6½d. to 6¾d. Solvent naphtha, naked, North, 1s. 5d. to 1s. 6d. Heavy naphtha, North, 9¾d. to 10¾d. Creosote, *ex* works, in bulk, North, liquid and salty, 3½d. to 3¾d.; low gravity, 3d. to 3¼d.; Scotland, 3d. to 3¼d. Heavy oils, in bulk, North, 3¾d. to 4¼d. Carbolic acid, 60's, 1s. 10d. to 1s. 11d. Naphthalene, £10 to £11. Salts, 55s. to 75s., bags included. Anthracene, "A" quality, 2½d. to 3d. per minimum 40%, purely nominal; "B" quality, unsalable.

* All prices for pitch are now quoted on the basis of f.o.b. In order to arrive at the f.a.s. value at any port it will be necessary to deduct the loading costs and the tolls whatever they may be.

Tar Products in Scotland.

GLASGOW, *Sept.* 1.

The market continues quietly steady with prices in most departments unchanged on the week's trading.

Crude gas-works tar.—Actual value is now 33s. to 35s. per ton *ex* works in bulk.

Pitch.—Market remains quiet with export value nominal at 45s. per ton f.o.b. Glasgow, and 42s. 6d. per ton *ex* works for home trade.

Refined tar.—Quotations are maintained at 3d. to 3¼d. per gallon in buyers' packages at makers' works, but business is falling off.

Creosote oil.—Demand continues on a satisfactory basis and prices of all grades are steady. B.E.S.A. Specification oil is 4d. to 4¼d. per gallon; low gravity, 4½d. to 4¾d. per gallon; and neutral oil, 4¼d. to 4½d. per gallon; all f.o.r. in bulk.

Cresylic acid.—Inquiries are quite numerous and prices continue steady. Pale, 97/99%, is 1s. 3d. to 1s. 4d. per gallon; dark, 97/99%, 1s. 0½d. to 1s. 1½d. per gallon; and pale, 99/100%, 1s. 4½d. to 1s. 5½d. per gallon; all *ex* works.

Crude naphtha is slightly easier at 4½d. to 5d. per gallon, according to quality.

Solvent naphtha.—90/160 grade is 1s. 3d. to 1s. 4d. per gallon, and 90/190 grade 8d. per gallon.

Motor benzole.—Value is nominal at 1s. 5d. per gallon.

Pyridines.—90/160 grade is 6s. to 7s. per gallon, and 90/140 grade 7s. to 8s. per gallon (nominal).

Benzole Prices.

These are considered to be the market prices for benzole at the present time:

	s. d.		s. d.	
Crude benzole	0 9	to	0 9½	per gallon at works
Motor ,,	1 3½	,,	1 4	,, ,, ,,
90% ,,	1 4	,,	1 4½	,, ,, ,,
Pure ,,	1 7½	,,	1 8	,, ,, ,,

Contracts Advertised To-Day.

Pipes, &c.

Sidmouth Gas Department. [p. 524.]

Tar.

Buxton Gas Department. [p. 524.]

New Capital Issues.

The Bognor Gas and Electricity Company.—It is intended to offer for sale by tender such an amount of 4½% redeemable debenture stock (1954) as will not exceed, including premiums, the sum of £7,695 9s. 8d., to be redeemed at par on Sept. 30, 1954. The minimum price of issue is £105 per £100, yielding at that price £4 3s. 6d.% per annum. Prospectus and form of tenders, which must be received at the Company's offices, Argyle Road, Bognor Regis, by noon on Tuesday, Sept. 18, 1934, may be obtained from the Secretary of the Company or the Westminster Bank, Bognor Regis.

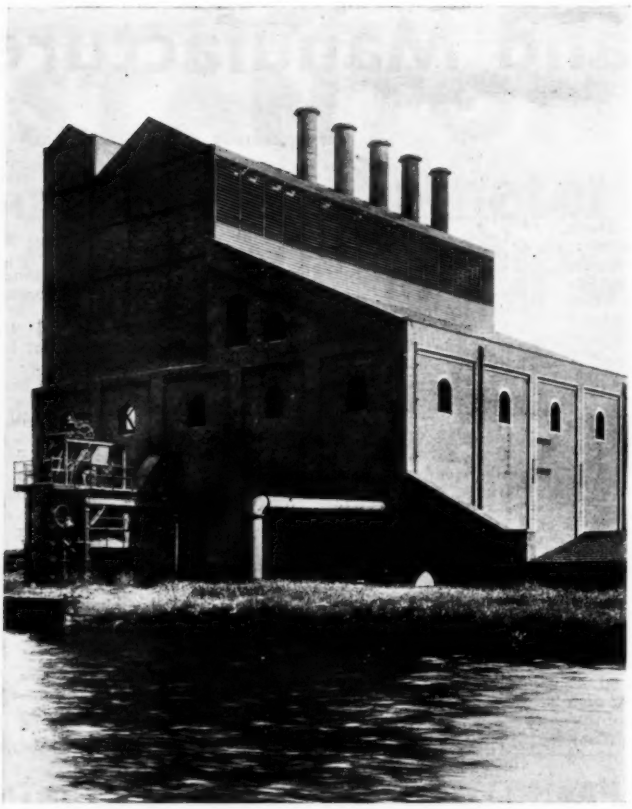
Trade Notes.

Cochran & Co., Annan, Ltd.

The Commercial Gas Company have ordered a large "Sinuflo" waste-heat boiler from Messrs. Cochran & Co. The boiler evaporates 16,500 lbs. of steam per hour, superheated 100° F. at 120 lbs. pressure per sq. in.

Illuminating Glassware.

We have received from the Wholesale Fittings Company, Ltd., of Commercial Street, E. 1, a copy of their recent published catalogue of "Supastone" lighting fittings. "Supastone is stated to give an intense soft white light of great brilliancy, without glare—this being accomplished by a three-ply glass (two layers of clear with opal in the centre), the outside and inside surfaces being polished satin matted.



FALKIRK

WEST'S GAS IMPROVEMENT CO LTD

ANOTHER 'REPEAT ORDER' FOR GLOVER-WEST VERTICALS

Falkirk adopted continuous carbonization on the Glover-West System in 1921, and the plant of forty vertical retorts illustrated above has supplied the gas requirements of the burgh continuously since that year. The new unit will have eight retorts of the steaming model, with an estimated daily gasmaking capacity of 720,000 cubic feet. There are now more than 350 installations of Glover-West vertical retorts in service or on order, with an estimated total daily output of 520 million cubic feet of gas.

GLOVER-WEST
VERTICAL RETORTS

•

WEST VERTICAL
INTERMITTENT
CARBONIZING CHAMBERS

•

THE WEST
LIP-BUCKET CONVEYOR
WITH AUTOMATIC LUBRICATION

•

CONVEYORS AND
ELEVATORS

•

COAL AND COKE
CUTTING AND GRADING
PLANT, ETC.

WEST'S CARBONIZING AND FUEL-HANDLING SYSTEMS

WEST'S GAS IMPROVEMENT CO., LTD.

TELEPHONE :
COLLYHURST 2961

MILES PLATTING, MANCHESTER 10

TELEGRAMS :
STOKER, MANCHESTER

STOCK AND SHARE LIST.

Official Quotations on the London and Provincial Stock Exchanges.

Issue. £	Share.	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations. Aug. 31.	Rise or Fall on Week.	Transactions. Lowest and Highest Prices During the Week.
1,551,868	Stk.	Apl. 9	7	7	Alliance & Dublin Ord. ...	135—145	...	139½—140
374,000	„	June 25	4	4	Do. 4 p.c. Deb. ...	90—100	...	...
557,655	„	Aug. 13	7	7	Barnet Ord. 7 p.c.	165—170	...	...
300,000	1	May 7	1/4⅝	1/9⅝	Bombay, Ltd.	27/6—29/6	...	...
178,480	Stk.	Aug. 13	9½	9½	Bournemouth sliding scale	212—217	...	...
550,050	„	„	7	7	Do. 7 p.c. max. ...	166—171	...	168—170
439,160	„	„	6	6	Do. 6 p.c. Pref. ...	140—145	...	...
50,000	„	June 11	3	3	Do. 3 p.c. Deb. ...	78—83	...	...
262,025	„	„	4	4	Do. 4 p.c. Deb. ...	103—108	...	...
335,000	„	„	5	5	Do. 5 p.c. Deb. ...	122—127	...	...
357,900	„	Aug. 13	7½	7½	Brighton, &c., 6 p.c. Con. ...	161—166	...	164—166
540,000	„	„	6⅔	6⅔	Do. 5 p.c. Con. ...	150—155	...	153
195,500	„	„	6	6	Do. 6 p.c. B. Pref.	138—143	...	...
1,487,500	„	July 9	5	5	Bristol 5 p.c. max.	116—118*a*	...	...
120,420	„	June 11	4	4	Do. 1st 4 p.c. Deb.	102—105*a*	...	...
217,870	„	„	4	4	Do. 2nd 4 p.c. Deb.	102—105*a*	...	...
338,790	„	„	5	5	Do. 5 p.c. Deb.	121—123*a*	...	...
885,000	„	Apl. 9	7	8	British Ord.	159—163	...	162—163
100,000	„	June 11	7	7	Do. 7 p.c. Pref.	154—159	...	...
350,000	„	„	5½	5½	Do. 5½ p.c. Pref.	104—109	...	...
120,000	„	„	4	4	Do. 4 p.c. Red. Deb. ...	98—103	...	...
450,000	„	„	5	5	Do. 5 p.c. Red. Deb. ...	107—115	...	...
160,000	„	June 11	5	5	Cambridge 5 p.c. Deb. ...	115—120	...	...
100,000	10	22 May '33	6	4	Cape Town, Ltd.	2—4	...	...
160,000	10	Nov. 6	4½	4½	Do. 4½ p.c. Pref. ...	4—6	...	...
150,000	Stk.	July 23	4½	4½	Do. 4½ p.c. Deb. ...	90—95	...	...
626,860	„	July 23	6	6	Cardiff Con. Ord.	129—133	...	...
237,860	„	June 11	5	5	Do. 5 p.c. Red. Deb.	103—108	...	...
157,150	„	July 23	6½	5	Chester 5 p.c. Ord.	113—118*b*	...	...
98,936	1	May 7	2/-	2/-	Colombo, Ltd. Ord.	1⅞—1½	...	...
24,500	1	„	1/4½	1/4½	Do. 7 p.c. Pref. ...	19/6—21/6	...	...
609,204	1	Mar. 19	/11'48	/11'48	Colonial Gas Assn. Ltd. Ord.	19/6—21/6	...	...
296,053	1	„	1/8·80	1/8·80	Do. 8 p.c. Pref.	23/6—25/6	...	...
1,775,005	Stk.	July 23	6½	5	Commercial Ord.	118—123	...	121
475,000	„	June 11	3	3	Do. 3 p.c. Deb. ...	83—88	...	...
286,344	„	Aug. 13	5	5	Do. 5 p.c. Deb. ...	120—125	...	...
807,560	„	Aug. 13	7	7	Croydon sliding scale ...	152—157	...	155
569,590	„	„	5	5	Do. max. div.	103—108	...	...
620,385	„	June 25	5	5	Do. 5 p.c. Deb.... ...	119—124	...	...
542,270	„	Aug. 13	10	7	Derby Con.	175—180*c*	...	...
55,000	„	June 25	4	4	Do. 4 p.c. Deb.	97—100*c*	...	...
209,000	„	Aug. 13	5	5	East Hull Ord. 5 p.c. ...	108—112	+3½	108—111½
181,625	„	Aug. 13	6	6	East Surrey Ord. 5 p.c. ...	126—131	...	...
175,609	„	June 11	5	5	Do. 5 p.c. Deb. ...	120—125	...	...
1,002,180	„	Apl. 9	†5	†7	European, Ltd.	124—129	...	125—128½
19,342,763	„	Aug. 13	5⅝	5⅝	Gas Light & Coke 4 p.c. Ord.	26/6—27/-*f*	...	26/6—26/9
2,600,000	„	„	3½	3½	Do. 3½ p.c. max. ...	87—90	...	89—90
4,477,106	„	„	4	4	Do. 4 p.c. Con. Pref. ...	104—107	...	105½—107
6,102,497	„	May 28	3	3	Do. 3 p.c. Con. Deb. ...	86—89	...	87½—88
3,642,770	„	„	5	5	Do. 5 p.c. Red. Deb. ...	115—118	...	117½
3,500,000	„	„	4½	4½	Do. 4½ p.c. Red. Deb. ...	113—116	...	115—116
270,466	„	Aug. 13	6	6	Harrogate New Cons. ...	127—132	...	...
140,000	1	Apl. 23	1/7½	1/7½	Hongkong & China, Ltd. ...	1⅛—1⅜	...	...
218,200	Stk.	Aug 13	6	6	Hornsey Con. 3½ p.c. ...	127—132	...	130½—131
5,600,000	„	May 28	10	14	Imperial Continental Cap.	205—215	...	206½—207½
228,130	„	July 23	3½	3½	Do. 3½ p.c. Red. Deb.	92—97	...	...
285,242	„	Aug. 13	8½	8½	Lea Bridge 5 p.c. Ord. ...	163—173	...	...
2,167,410	„	Aug. 13	6	6	Liverpool 5 p.c. Ord. ...	132—134*b*	...	...
245,500	„	June 11	5	5	Do 5 p.c. Red. Pref. ...	101—111*b*	...	...
806,083	„	July 16	4	4	Do. 4 p.c. Deb. ...	100½—102½*b*	...	...
165,786	„	Aug. 27	10	8	Maidstone 5 p.c. Cap. ...	180—190*	...	...
56,176	„	June 25	3	3	Do. 3 p.c. Deb. ...	71—76	...	...
75,000	„	May 28	†10	†10	Malta & Mediterranean ... Metropolitan (of Melbourne)	200—210	...	...
392,000	—	Apl. 3	5½	5½	5½ p.c. Red. Deb.	101—104	...	...
231,978	Stk.	Aug. 13	5	5	M. S. Utility "C." Cons. ...	111—116	...	...
818,657	„	„	4	4	Do. 4 p.c. Cons. Pref.	97—102	...	99—101
360,075	„	June 11	4	4	Do. 4 p.c. Deb. ...	100—105	...	...
148,955	„	„	5	†5	Do. 5 p.c. Deb. ...	119—124	...	...
125,000	—	July 2	...	11/8	Do 3½ p.c. Rd. Rg. Bds.	97—100	...	...
675,000	„	May 28	†6	††3	Montevideo, Ltd.	58—63	...	...
2,061,815	„	Aug. 13	6⅔	5	Newcastle & Gateshead Con.	25/6—26/3*d*/*f*	+·/1½	...
682,856	„	„	4	4	Do. 4 p.c. Pref. ...	100½—101½*d*	+1	...
776,706	„	June 11	3½	3½	Do. 3½ p.c. Deb. ...	90½—91½*d*	...	...
277,285	„	May 7	5	5	Do. 5 p.c. Deb. '48 ...	105—107*d*	...	...
274,000	„	Aug. 13	5	5	Newport (Mon.) 5 p.c. max.	105—107*a*	...	...
204,940	„	Aug. 13	7½	7½	North Middlesex 6 p.c. Con.	153—158	...	...
396,160	„	Aug. 13	5	5	Northampton 5 p.c. max. ...	102—107	...	...
300,000	„	May 7	†9	†7	Oriental, Ltd.	162—167	...	166—167½
416,617	„	June 11	8	8	Plym'th & Stonehouse 5 p.c.	177—182	+10	180½—181
504,416	„	Aug. 13	8	8	Portsm'th Con. Stk. 4 p.c. Std	166—171	...	...
241,446	„	„	5	5	Do. 5 p.c. max. ...	103—108	...	...
114,000	„	July 23	5	5	Preston 5 p.c. Pref.	101—106	...	...
1,736,968	Stk.	Aug. 27	6	6	Sheffield Cons.	137—137*e**	−2	...
95,000	„	July 9	4	4	Do. 4 p.c. Deb.	100—104*e*	...	...
133,201	„	Aug. 13	5	8½	Shrewsbury 5 p.c. Ord. ...	137—142	...	...
90,000	10	May 28	14	13	South African	2—4	...	...
889,095	1	May 7	1/2⅛	1/2⅛	South East'n Gas Co. Ltd. Ord.	27/9—28/9	...	...
736,061	1	Apl. 9	-/10½	-/10½	Do. 4½ p.c. Red. Cum. Pref.	21/9—22/9	...	...
450,000	Stk.	Aug. 13	74/4	4	Do. 4 p.c. Red. Deb. ...	100—103	...	...
6,709,895	„	Aug. 13	7	5	South Met. Ord.	135—138	...	137—137½
1,135,812	„	„	6	6	Do. 6 p.c. Irred. Pf.	141—146	...	...
850,000	„	„	4	4	Do. 4 p.c. Irred. Pf.	102—105	...	...
1,895,445	„	June 25	3	3	Do. 3 p.c. Deb ...	84—87	...	...
1 000,000	„	July 9	5	5	Do. 5 p.c. Red. Deb.	113—116	...	...
209,820	„	Aug. 13	8½	8½	South Shields Con.	164—166*d*	...	...
1,543,795	„	July 9	6	6	South Suburban Ord. 5 p.c.	133—136	...	133—134½
512,825	„	„	5	5	Do. 5 p.c. Pref.	120—125	...	...
300,000	„	„	4	4	Do. 4 p.c. Pref.	101—106	...	...
868,837	„	June 11	5	5	Do. 5 p.c. Deb.	121—126	...	123—125½
100,000	„	„	4	4	Do. 4 p.c. Deb.	102—107	...	...
647,740	„	Aug. 13	5	5	Southampt'n Ord. 5 p.c. max.	108—113	...	...
121,275	„	June 11	4	4	Do. 4 p.c. Deb.	99—104	...	...
350,000	„	Aug. 13	5½	5½	Swansea 5½ p.c. Red. Pref.	107—112	...	...
200,000	„	June 11	6½	6½	Do. 6½ p.c. Red. Deb.	100—105	...	103½—104½
1,076,490	„	Aug. 13	6⅔	6⅔	Tottenham and District Ord.	153—158	...	155—157
409,835	„	„	5½	5½	Do. 5½ p.c. Pref. ...	125—130	...	...
62,235	„	„	5	5	Do. 5 p.c. Pref. ...	113—118	...	...
199,005	„	June 11	4	4	Do. 4 p.c. Deb. ...	100—105	...	103
349,110	„	Aug. 13	7	7	Uxbridge, &c., 5 p.c. ...	153—158	...	...
88,330	„	„	5	5	Do. 5 p.c. Pref. ...	112—117	...	...
1,322,220	„	Aug. 13	7	7	Wandsworth Consolidated	157—162	...	159—161½
1,096,373	„	„	5	5	Do. 5 p.c. Pref.	119—124	...	122½
1,317,964	„	June 11	5	5	Do. 5 p.c. Deb.	121—126	...	125—125
208,300	„	„	...	26/8	Do. 4 p.c. Deb.	104—107	...	...
158,400	„	Aug. 13	6*g*	5	Winchester W. & G. 5 p.c. Con.	115—120	...	...

Quotations at:—*a*.—Bristol. *b*.—Liverpool. *c*.—Nottingham. *d*.—Newcastle. *e*.—Sheffield. *f*.—The quotation is per £1 of stock. *g*.—Paid £3, including 10s. on account of back dividends. * Ex. div. † Paid free of income-tax. ‡ For year.

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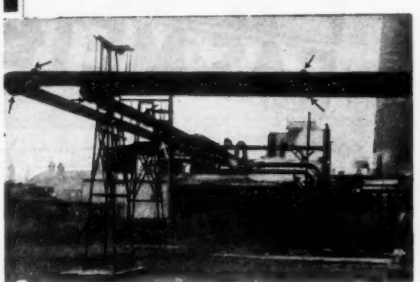
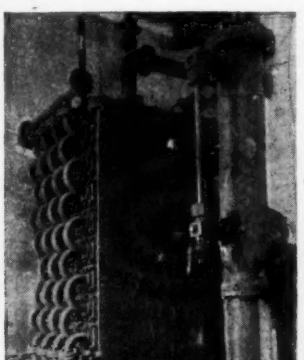


Two Steam Mains, one at a Pressure of 170 lbs. per square inch, the other at 20 lbs. per square inch.



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